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ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY.*

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S., President.

The events of the year have turned attention more to the splendid valour of our troops in resisting an invasion of the Queen's colonies than to peaceful geographical labours. But our science, in one branch or another, is always in requisition, and never more so than in warlike operations. The deficiency in accurate topographical maps has been, at times, a serious impediment to the advance of our armies; and I am glad to know that the attention which was called to this serious want by Sir Thomas Holdich, in his paper read before the United Service Institution, has resulted in the question of the execution of timely surveys in all our colonies being taken into consideration by the authorities, in a way which is likely to lead to action. Sir Thomas pointed out that, in order that reliable military maps might be at hand when required, there should be a carefully trained Survey Department for field work in every colony, consisting partly of natives. Upon the basis of their surveys, maps would be constructed for administrative and political purposes, while a thoroughly efficient corps of local surveyors would accompany a general's staff in time of war.

In the present operations in South Africa, the Fellows of this Society are leading our armies to victory, and serving usefully and gallantly in great numbers. Our old and respected associates, Lord Roberts and Lord Kitchener, are showing that a geographical instinct is one of the requirements for a successful general. Sir Charles Warren, formerly on our Council, is also doing good service; and, among many others, I may mention Major Grant, but recently on our Council, to whom the only

* Read at the Anniversary Meeting, May 21, 1900.

bit of really accurate mapping in South Africa is, I believe, due; and Captain Wellby, who went through the siege of Ladysmith, and whose interesting paper on his journeys from Abyssinia to Khartum will be read this session. That all the many Fellows of this Society now at the front, from Lord Roberts through all ranks, may pass safely through the perils and hardships of this most righteous war, and be restored to us in due time, is, I know, the earnest prayer of us all.

We have done our best, now for a considerable number of years, to train and instruct military men and others, in order that their usefulness may be increased when on service in distant countries, both in time of peace and during warlike operations. Our system of instruction has been most successful, and our diplomas are now highly valued. It may well be that it might be improved and extended, and that it may become a still greater success, but we must always remember to whom we owe all the progress that has hitherto been made. Mr. Coles, I deeply regret to have to announce, has been obliged to retire on account of ill health. It would not be possible for me to overestimate the value of his services to this Society, or to express to you fully my deep sense of the merits of our friend. For twenty-three years he has been our map curator, and for twenty years he has been our scientific instructor. Accomplished in all the knowledge required in his position, diligent, methodical, and painstaking, I observed in him also, during his long period of service, a strict sense of duty and an integrity of purpose which, in my belief, bore hardly on his physical powers. His courtesy to the numerous visitors to the map-room, and the trouble he was always ready to take in order to satisfy inquiries, is within the experience of many here present. Of his rare gifts as a teacher I can speak from knowledge, for I have myself been his pupil, and my testimony will be borne out by many others. He was luminous and clear in his explanations, always ready with help, always patient. Among all his pupils, from the Viceroy of India to the youngest traveller that has benefited from his instruction, the regret at his retirement will be heartfelt and sincere. It has grieved me to see Mr. Coles working on for the Society when he ought to have been giving himself complete rest. I blame myself for not having insisted on his sparing his sinking frame in the last year or two, and I feel now that he has seriously injured his health by his single-minded zeal for our interests. I am sure that the warmest wishes for his welfare from all the Fellows of this Society will follow Mr. Coles in his retirement.

Mr. Coles will be succeeded as map curator by Mr. Reeves, who has served as his assistant for over twenty years, and who, like his chief, has been long known to visitors of the map-room, for his courtesy and his knowledge of cartography.

The new edition of 'Hints to Travellers,' edited by Mr. Coles, is practically completed and in print, and it is hoped that it will be ready

for publication by the end of the year. It will be issued in two volumes. The first will contain the section on surveying and astronomical observations, with the necessary tables; and the second will consist of the other sections, which, in the previous editions, have been given in the latter part of the single volume. Each volume will be in so compact a form that it can be carried in a traveller's pocket. The remarks and advice on outfit will be issued as a separate pamphlet.

The instruction in all that is contained in the 'Hints to Travellers' is given in our own house. Our other measures taken for the advancement of geographical education are now connected with one of the Universities. We give substantial financial support to the new Oxford School of Geography, which is assisted with equal liberality by the University itself. This institution has now been at work for six months, under the superintendence of Mr. Mackinder, with encouraging success. Mr. Mackinder is assisted by Mr. Herbertson, Mr. Dickson, and Mr. Grundy. The various lectures have been largely attended. A certain number of students are going through the complete course of geographical training; and a substantial beginning has been made in the collection of a special library, and towards an equipment of suitable instruments and other apparatus for practical work. There is every reason to hope that the Oxford University will institute a diploma in geography, which cannot fail to be an inducement in attracting students, and should give this very important subject a substantial place in the University curriculum. At Cambridge Mr. Yule Oldham, in addition to his usual courses of lectures, has been delivering a series of lectures on the history of geographical discovery, which has attracted great audiences. On the whole, the Society has cause to be gratified with the results which have so far attended its efforts to improve the position of geographical teaching in this country.

The Geographical Association is also doing good work. Its President is our former able secretary, Mr. Douglas Freshfield, and under his auspices the Association is doing much to improve methods of teaching in schools, and to provide apparatus. It is an Association which all teachers would do well to join.

Our own great work during the last year has been the completion of the Subjects Catalogue up to 1893, comprising more than 100,000 card titles. These have now been arranged in 160 boxes, classified according to localities and subdivided according to subjects. The boxes are arranged in a special case in the librarian's room; where are also the boxes containing the 20,000 card titles covering the accessions from 1893 to the date of issue of the last number of the *Geographical Journal*. All these are available for the use of Fellows; but the large number of cards under each heading, and the risk of misplacing cards in returning them to the boxes, makes it necessary that any consultation of the catalogue should be carried out by the librarian or one

of his assistants. While the classification of the cards is complete as far as regards the different countries of the world and their subdivisions, there are many cross-references to be filled up before the work can be looked upon as absolutely finished. The question of printing the catalogue is a very serious one, and I have not ventured even to think of it as a practical one. If it was printed in a form similar to the present Authors Catalogue, the entries, including cross-references, would number about 160,000, and, on the moderate average of three lines to a title, the whole would require 3810 pages in double columns, or five volumes as large as the present Authors Catalogue. The printing would cost £2000, and the copying of the cards for the printer, and correcting proofs, would amount to several hundred pounds more. This is out of the question in the present state of our finances, and will be for some time to come. Meanwhile this great work is accessible for geographical students. Our zealous librarian, Dr. Mill, well deserves the thanks and congratulations of the Fellows; for I do not believe that there is anything so complete and exhaustive, and so valuable for those engaged in geographical research, to be found elsewhere.

At the suggestion of our colleague, Sir Cuthbert Peek, to whom this Society owes much in other ways, we are doing for our collection of photographs what has already been done for the publications in the library. The Society's collection of photographs now numbers something like 20,000. These are all arranged in boxes according to their subjects, and hitherto they have been only catalogued under general headings; now we are compiling a general card catalogue, in which every photograph is entered with its title, under a series of headings and sub-headings. The immense utility of such a catalogue will be evident, both in enabling any required photograph to be quickly found, and in providing photographs for purposes of preparing slides for lectures.

I need not remind you that our Society does its best to issue maps of previously unmapped or unexplored portions of the world. I referred in the beginning of the session to the map of Siam, by our gold medallist, Mr. McCarthy, as being in progress. I am glad to be able to announce that it is now completed and published. It is a credit to its author, and to the Siamese Government, under whose auspices the work was carried out, and at whose expense the map has been beautifully produced on copper. Besides this, as those of my associates who examine our *Journal* will admit, the Society, during the past year, has made many important and beautiful additions to cartography. I may mention especially the maps illustrative of the researches of Sir John Murray and Mr. Pullar into certain of the lochs of Scotland.

Our *Journal* still continues to maintain its position, and I have the means of knowing that it is held in very high esteem by the geographers of the world, both for the fulness and the accuracy of the information

it contains, and for the ability with which it is edited. This success, which is due to the unwearied diligence of our accomplished secretary, Dr. Scott Keltie, merits our recognition and acknowledgments. The Paris Geographical Society has this year recognized the merits of our *Journal*, by following our example, and issuing a monthly Geographical Journal instead of the *Bulletins* and *Comptes Rendus* of the past. The French journal is issued in a very handsome form, and is certainly a decided step in advance. I congratulate our French colleagues on the improvement they have made in the form and arrangement of their valuable and interesting publications.

The plan, brought forward by Dr. Mill in April, 1896, for a geographical description of the British Islands to illustrate and accompany the sheets of the Ordnance Survey was cordially welcomed by me at the time, and received almost universal approval from all the authorities to whom it was submitted. Further consideration has quite convinced me of the value and importance of Dr. Mill's proposal. Its chief feature is that the treatment should be exclusively from the geographical standpoint; and hence the memoir for each sheet, as well as a county history condensed from the sheet memoirs, would be more methodically and scientifically treated than has ever been attempted before. The value of such memoirs for national and secondary schools would be very great, for they would give the student that thorough knowledge of his own geographical surroundings which is essential to an accurate understanding of physical aspects over more extended areas. Nor would their usefulness cease with educational purposes. Almost every occupation in life would be advanced by the assistance to be derived from knowledge arranged in this form.

I have, on several occasions, striven to impress upon the minds of local audiences the fact that geographical researches may be made within the range of a few miles of their own homes, and that there can be no better training for a geographer than the study of the various branches of inquiry which are comprised in our science, within his own river-basin. Dr. Mill brought his excellent scheme into practical operation by selecting the sheet of the Ordnance Survey comprised in south-west Sussex, and carrying out researches on the plan sketched out in April, 1896. The result was given to us in the very interesting paper read at one of our meetings in February. I must say that I should be pleased to hear of that paper being read at Chichester and other places in the chosen Ordnance sheet, in order that a local interest might be aroused in the subject within the selected area. For it is by the formation of such small centres of interest that a whole mass is leavened, and it is thus that steady advances in the varied pursuits and objects which are included in human progress are secured. The preparation of such memoirs for all the sheets of the Ordnance Survey is far beyond the resources of this Society; but the

Council is desirous that so useful a project should not be lost sight of, and will do what is possible to secure that end. Our first step has been to make a representation to the department most interested in the matter, to ascertain whether there is any hope of assistance from Government for an object which appears to us to be of national importance.

A relic of great interest, which has recently reached England, is a section of the tree under whose shade Dr. Livingstone's heart was buried, with the inscription carved by the great explorer's native followers. It is nearly two years since Mr. Alfred Sharpe, the Administrator of British Central Africa, kindly undertook, at the request of the Council, to procure this interesting relic for the Society. As he was unable to proceed to Lake Bangweulu himself, he requested Mr. Robert Codrington, an official of the British South Africa Company, who was undertaking an expedition in that direction, to carry out the work for him. Mr. Codrington did this most successfully, and without any cost to the Society, though of course the Council originally expressed its willingness to bear any reasonable expense. The thanks of the Society are due to the Company for their generous aid in conveying the section of the tree from Lake Bangweulu to England, and sending it to the house of the Society. I may further state that a committee has been formed, consisting of representatives of the Council and of a movement in which Sir Henry Stanley has taken a leading share, to obtain funds for the erection, on the spot where the tree stood, a suitable memorial to Dr. Livingstone. This plan is so far advanced that, in the course of a week or two, the materials will be sent out from this country with which to erect a handsome obelisk 20 feet high, surmounted by a cross, with bronze plates let into the face having suitable inscriptions; the materials will be conveyed free of expense from the mouth of the Zambezi to Lake Bangweulu, by the kindness of the African Lakes Corporation and the British South Africa Company. Every means will be adopted to render this memorial impervious to deteriorating effects of the climate. The section of the Livingstone tree is at present in a case in the map-room.

Here I think I ought to bring the fact to your notice that every year we are becoming more and more hampered for want of space in the Society's house. We have constantly to decline accepting curiosities of geographical interest from various parts of the world, simply because we have no suitable place in which to display them. If the Society had the accommodation which it ought to have, we might possess the finest geographical museum in the world. As it is, we are compelled to scatter our library all over the house, at much inconvenience and some risk, while the fact that we have no proper meeting-place of our own hampers us in many ways. The question of obtaining suitable accommodation for the Society will, before very long, become a very pressing one.

One of the most striking journeys of the past year has been that accomplished by Mr. Grogan, who has, for the first time, actually traversed the centre of Africa from the Cape to Cairo. He was accompanied part of the way by Mr. Arthur Sharp. The journey was a remarkable feat, but it was a great deal more. For Mr. Grogan has brought back much valuable information respecting the remarkable region round Lake Kivu and on the eastern shore of Lake Albert Edward, as well as concerning the Dinka country to the east of the upper Nile.

The results of Mr. Mackinder's visit to Mount Kenya show how much can be accomplished by a well-trained and observant traveller when he devotes himself to a limited area, even within a very short period.

What with official and unofficial expeditions on the upper Nile and its tributaries, and in the Lake Rudolf region, we may shortly expect many additions to our knowledge of that section of Africa. Our Gold Medallist of last year, Mr. Foureau, has not yet returned from his adventurous journey across the Sahara to Timbuktu, nor can we be sure that he yet knows of the honour which the Society conferred upon him, but we have every reason to hope and believe that he is safe, after escaping from the dangers which at one time surrounded him. Major Gibbons, according to the latest news, had reached Uganda, and is now probably on his way down the Nile. He will be the second traveller to make his way from the Cape to Cairo. Judging from letters received at the Society, it is clear that he has been doing very excellent work in the country which is watered by the feeders of the upper Zambesi, and in the watershed between the Zambesi and the Congo. I hope we shall soon be able to welcome Major Gibbons, when he will tell us his own interesting story in his own way.

From Asia, during the past year, we have had to welcome the return of our Gold Medallist, Captain Deasy, from his two years' most trying but highly successful exploration of a wide region to the east of the Pamirs. Another journey, of which we may hope to receive a more detailed account than we have yet had, was made by Captain Wingate from China to Burma, to a considerable extent by a route not previously traversed. This route was mapped in much detail, and I hope that Captain Wingate's survey may be made available for geographical purposes. News from Major Sykes show that our indefatigable associate is working hard to elucidate the past and present geography of Persia. Mr. Douglas Freshfield has recently returned from an expedition which had for its object an examination of the lofty region over which the great Kiuchiu-junga rises. He was accompanied by Mr. Garwood, and other competent observers; and we may expect, as a result, to have a very interesting study of the physical geography and the glaciation of this section of the Himalayas.

In the arctic regions, Captain Sverdrup and Lieut. Peary are believed to be at work in the channels leading north from Smith sound, and the Duke of Abruzzi has wintered in the region of Franz Josef Land. We may hope for news from some or all of these expeditions next autumn. We also await further news from the Antarctic Expedition of Sir George Newnes.

Dr. Nansen has published the first volume of the scientific results of his memorable Arctic Expedition in English. The whole work will consist of five or six quarto volumes, and will be completed in about two years. The first volume contains five memoirs. The first is an interesting account of the construction of the *Fram* by Mr. Colin Archer. The second is a geological sketch of Cape Flora and its neighbourhood by Dr. Nansen himself, who gives full credit to his companion in geological research, Dr. Koettlitz, the accomplished medical officer of the Jackson-Harmsworth Expedition. The third is on the fossil plants of Franz Josef Land, the fourth an account of the birds, and the fifth of the crustacea by Prof. Sars. The volume is profusely illustrated. The complete work will be a fitting record of one of the most memorable expeditions of the century.

We have had much new and most interesting information from South America during the year, chiefly with reference to the Patagonian Andes. Whole regions, including large lakes, deep fjords, and mountain ridges, all previously unknown, have been described to us, and we have received new and particularly interesting geographical information. Our valued colleague, Dr. Don Francisco Moreno, has shown us a number of valuable maps and photographs, and has read us an extremely instructive paper on the eastern slopes of the Patagonian Andes. Prof. Bertrand of Santiago de Chile, at an afternoon meeting, has fully explained to an appreciative and learned audience his system of surveying a difficult and mountainous country. Dr. Steffen has communicated to us an account of his exploring labours, during several years, on the western or Chilian side of the southern section of the backbone of South America. But the still unsettled question of arbitration makes this region, teeming as it does with points of geographical interest, a somewhat forbidden ground for the present. Maps of the region will, however, shortly appear in the *Journal*.

The prospects of the Antarctic Expedition, from a financial point of view, have been somewhat clouded by the war. Through the munificence of our Fellows, and the liberality of our Council, a sum of upwards of £40,000 was raised a year ago. This enabled the two Societies to invite all leading men of science, as well as arctic officers, to accompany the two Presidents in a deputation to Mr. Balfour, to ask for a grant in aid from the Government. In the unavoidable absence of Lord Lister, it became my duty to present the deputation on June 22 of last year. In reply to us, Mr. Balfour made a most cordial speech, fully recognizing

the importance of such expeditions to science and to the country. He even extended his anticipations of valuable results beyond those which we had enumerated in a very striking passage of his speech. "The things," he said, "which we go forth directly to observe, and with the fore-ordained intention of observing, are doubtless of the highest importance; but I should be greatly surprised if the expedition does not come across a great many phenomena which we did not expect to observe, and which will throw a novel light upon many of our most important scientific theories." Mr. Balfour, with a touch of Ithuriel's spear, threw a still brighter light upon our hopes, and widened almost indefinitely the possible scope of our discovery of new truths. The First Lord of the Treasury expressed his hope that our expedition would be adequately equipped, and his satisfaction that we should co-operate with a German expedition animated by the same scientific hopes as our own. He told us, in conclusion, that the Chancellor of the Exchequer would give substantial aid, sufficient to enable us to send out the expedition in a manner not unworthy of the two great Societies and of the nation.

But the subsequent letter from the Treasury, dated July 3, disappointed us. The sum of £45,000 was less than the lowest we had expected. Not only was it less than our smallest hopes, but it was saddled with wholly unexpected conditions. It would only be granted at all on the condition that not less than an equal amount (or £45,000) was raised from other sources. Moreover, it would only be paid in instalments extending over four years. We had only collected £40,000, and when the time came, at the end of last year, for the first instalment to be put in the budget, we found that the condition must be complied with, or we should lose the grant. £5000 were needed. I made appeals for help, but there was no response. The fate of the expedition was at stake. Then it was that our Council liberally came forward and saved it, by guaranteeing the required amount. All help was denied elsewhere. Our Council altogether will have contributed £8000. It is a very large sum considering the numerous calls upon us, and will necessarily, I fear, cripple our other work for years to come.

Yet I think that we have done right. If we look back at our previous history, we shall see that very great and permanent results have been gained by similar liberality in the same great cause. When we were still comparatively poor, we largely assisted Sir George Back's arctic land journey, we paid for the exploration of Guiana by Schomburgk, of South-west Africa by Alexander, of Kurdistan by Ainsworth, and gave assistance to Beke in Abyssinia. Later we shared equally with the Government in the expense of the expeditions of Burton and Speke, and of Speke and Grant. Our colony of Uganda is the result. We spent many thousands of our capital on the discoveries of Livingstone and the search expeditions. One result was the flourishing colony of Nyasaland. We spent £7000 on Mr. Thomson's expedition,

with most satisfactory results. I cannot doubt that such large expenditure for really great objects is a wise policy, and is desirable for advancing our science. Our present antarctic expenditure is not greater than has, in former years, been disbursed for geographical discovery in Africa on more than one occasion. Certainly our present undertaking is the greatest and the most difficult that our Society has ever entered upon. It is an enterprise which fills the imagination with thoughts of great deeds, and with noble aspirations. It is an enterprise presenting obstacles only to be overcome by very high qualities and rare gifts. It is, therefore, an enterprise fit for English sailors to undertake, and for us to help by every means in our power. For what our Council has done I feel sure of the hearty approval of the Fellows of this great Society. But we need more money, at least £30,000, and when the time is more opportune I shall begin begging again.

Amidst many cold refusals at home and in the Australian colonies, we must return our warmest thanks to the noble colony of Queensland, for having appreciated the value of scientific researches, and for having come forward with substantial aid. Lord Lamington, the Governor of Queensland, is a former member of our Council. The Government is liberal and enlightened, and the Queensland Geographical Society is presided over by Sir Hugh Nelson, from whom I have received the warmest wishes for our success, and the most generous support. Nor can I ever touch upon this subject of liberal help without referring to the munificence of our own associates, foremost among whom are the names of Mr. Longstaff, now a member of our Council, and of Mr. Harmsworth.

Apart from the finances, the affairs of the expedition are in a flourishing state, and everything seems hopeful. Our main object is geographical discovery in an unknown region with an area of 9,000,000 square miles, infinitely more difficult of access than any other region in the world—I mean geographical discovery in its widest sense, embracing terrestrial magnetism, meteorology, and oceanography, as well as the study of land masses and glaciation. But we have the great advantage of being able to divide the labour with the German expedition, with the promoters and leader of which we are on the most cordial terms.

Baron F. von Richthofen, the President of the International Geographical Congress, has been foremost in furthering the objects of the German Antarctic Expedition, and in co-operating with the able and accomplished leader of that expedition, Herr Erich von Drygalski. When I was in Berlin last October, I had conversations with both these eminent geographers, and we arranged a division of labour. For purposes of reference and to facilitate discussion, I divided the circle of the antarctic regions into four quadrants, to which the names of Victoria, Ross, Weddell, and Enderby were given—

The Victoria Quadrant, 90° E. to 180°	British.
The Ross Quadrant, 180° to 90° W.	
The Weddell Quadrant, 90° W. to 0°	German.
The Enderby Quadrant, 0° to 90° E.	

Our expedition will direct its efforts to the Victoria and Ross quadrants, south of Australasia and the Pacific; while the Germans undertake the Weddell and Enderby quadrants. Our actual plans cannot be arranged without consultation with the commander of our expedition. The Germans intend, as I understand, to establish a station at Kerguelen island. The ship will then be forced southwards on the meridian of about 70° E., with the object of wintering on the western side of Victoria Land and exploring that region in the spring. In another season, or if the Enderby Quadrant is not found practicable in the first season, the Weddell Quadrant will be undertaken.

The Germans are building their ship at Kiel; all preliminaries have been arranged, and their preparations are in a forward state. The councils of the two English societies and the German committee are most anxious to work in friendly unison and co-operation, and already there has been occasion to have an exchange of views on the subject of the magnetic and meteorological observations, which has been in all respects satisfactory. There will be magnetic stations at Melbourne and at Kerguelen island certainly, and we trust at other places.

As regards this question, our accomplished colleague, Dr. Don Francisco Moreno, has kindly come forward with advice and assistance. He ascertained for me that the Argentine Government was disposed to assist and co-operate with the British and German Antarctic Expeditions in any way in its power. The exact nature of the request has been settled, and identical letters have been addressed to the Argentine ministers in London and Berlin, proposing the way in which their Government might help us, by the establishment of a first-class observatory in a high southern latitude. It is with very great pleasure that I, who have long taken a deep interest in the welfare of the South American Republics, am able to welcome this desire to co-operate with the two European nations for the advancement of science. We in this country, I am quite sure in concert with our German friends, are pleased to receive, not only sympathy, but co-operation from the Argentine Government.

The keel of our exploring ship is now laid at Dundee. She will be the best polar exploring vessel, in every point of view, that has ever left these shores, and the first that has ever been built in this country specially for scientific work in polar regions. Our warmest thanks are due to our associates who have taken so much trouble in preparing the design, more especially to our Vice-President, Sir Leopold M'Clintock, and to Admiral Markham, the Chairman and Secretary of the Ship Committee. Acknowledgments should also be made to Mr. Smith, one of

the chief constructors of the Navy, for the diligent and untiring industry with which he has given us his help. His ability and experience in the construction of wooden ships have been invaluable. We also have to thank Mr. Marrach for assistance connected with the engines.

Lord Lister has consented to preside over a sub-committee, to consider questions connected with provisions and dietary, and with the hygiene of the ship. He has brought together, to advise him, several accomplished and experienced gentlemen, whose assistance will be of great value.

Our colleagues, belonging to both societies, who have been so good as to become members of the scientific sub-committees, are ready with advice and assistance, and several have undertaken work connected with the preparation of instructions and information for our explorers. It will be remembered that, when the Arctic Expedition of 1875 was equipped, a volume on the geography and ethnology was prepared and published at the expense of this Society, and that a larger manual, with instructions, was prepared by a committee of the Royal Society, under the editorship of Prof. Rupert Jones, and published at the expense of the Government—the Blue Book and the White Book. They were not only very useful to that expedition, but also to several subsequent arctic expeditions, as I have been informed by Baron Nordenskiöld. I have been anxious that a similar manual and instructions should be prepared for the Antarctic Expedition, and I am glad to be able to say that the members of our Geological and Biological sub-committees have undertaken such a manual, and have divided the work. The whole will, I hope, be edited by Mr. George Murray of the British Museum.

We shall be able to accommodate three civilians on board for scientific work, and the surgeon will also undertake a branch of scientific investigation, so that the civilian scientific staff will consist of four workers. There will be the same number on board the German ship. The chief of this staff will be our associate, Dr. Gregory, whose valuable papers, read at our meetings, prove him to possess not only learning, but imaginative faculties well under the control of his judgment, and literary powers of no mean order. He is now Professor of Geology at Melbourne, but he has obtained leave from that university to join the expedition.

By far the most important point, however, has been to obtain the sanction of the Admiralty for naval officers to join the expedition. It will be remembered that, when I had an interview with the First Lord of the Admiralty, some time ago, he was unable to hold out any hopes. The speech of Mr. Balfour to the Antarctic Deputation, and the Parliamentary Grant, altered the situation, and I felt that the time had come to make another appeal. One of our colleagues, a distinguished naval

officer and a warm friend to the expedition, was so good as to prepare the way, and, indeed, I believe that his intervention secured our object. I then applied for officers to the First Lord, urging that the situation had been quite changed by the fact that the Government was now a partner, and indeed the largest partner, in our enterprise. The First Lord and the Naval Lords saw the question from the same point of view; and Mr. Goschen informed me that, although it was very difficult to spare lieutenants, he would lend two excellent officers for service in the expedition, one of them to command. Moreover, the Lords of the Admiralty will also let us have two or three officers of the royal naval reserve to complete the executive staff.

This is a great point gained, and we must all feel the consideration and liberality with which their lordships have treated us. For undoubtedly there were difficulties in the way, and the arguments against us were not without weight.

The two "excellent young officers"—I use Mr. Goschen's words—will be untried as regards antarctic navigation. That is inevitable; but they are not untried in many other respects. Skilled in navigation, in seamanship, and in several branches of science, full of zeal and devoted to duty, our young naval commander has all the qualifications for leading a scientific expedition. As a geographer, and as a very old Fellow of both the Societies associated in this enterprise, I hail the appointments with the greatest satisfaction, as calculated to ensure the results we desire; and I feel sure that my feeling is shared by the Fellows of this Society. But we may well rejoice at these naval appointments, not only as geographers and friends of scientific progress, but also as lovers of our country. It is one of our urgent national requirements that the navy should be given opportunities of distinction in peace as well as in war. We have just seen our sailors saving their country from a great peril at Ladysmith. Should we not rejoice at giving them an opportunity to do battle with and to conquer the antarctic ice, as our navy always conquers. Polar voyages are the best training-grounds for our navy in time of peace. Nelson prepared for Trafalgar in the polar regions. The discipline of polar service teaches, as nothing else can, self-reliance, quickness of eye, steadiness of nerve, and the necessity of comradeship. It makes men thinking beings instead of well-drilled machines; more handy, more agile, and more generally useful. These are the very qualities needed in the operations of war. It is from the furious gale, off the frozen lee shore, among the hardships and perils of polar navigation, that Britons learn those qualities which have made so many enemies quail before our unconquered fleets. Even if there is no gain to science, still it is well that our seamen should defy the obstacles of the frozen sea. Most of us must have felt this. One of the Fellows of this Society, now passed away, put it into noble words, when told that polar exploration was useless—

"But be it so. It is from these alone,
The tempest's murmur and the ice-floe's groan,
The power to stand unshrinking when the blast
Shakes the cold sky, careering fierce and fast,
That England's sons defy the storms of war,
And the world quails before Britannia's star.
Still, tho' in vain, may her bold prows explore
The frozen ocean and the barren shore."

In conclusion, I would remind you that I have now occupied this chair for seven years, a period unprecedented since the days of Sir Roderick. It can at no time be an easy post, nor can it be held without a heavy feeling of responsibility and anxiety. I speak of the President's work alone. But to it has been added the initiation, the raising of funds, and all the other preparations for the Antarctic Expedition. This business has increased until now the President's work is quite doubled. I would cheerfully undertake it all if it was work and nothing more. I have given my whole heart to your interests, and I am sure you know that I shall continue to do so as long as you retain me as your President. I have spared neither time nor diligence. That I can honestly declare. It is for you to say whether the Society's welfare, and the welfare of the Antarctic Expedition in which you have so large a stake, is safe in my hands, and whether I have conducted your affairs to your satisfaction.

THE PATAGONIAN CORDILLERA AND ITS MAIN RIVERS, BETWEEN 41° AND 48° SOUTH LATITUDE.*

By Dr. HANS STEFFEN.

EVERY passenger on board of one of the Pacific liners bound for the western coast of South America has the opportunity of surveying at close range, while sailing through the western reaches of Magellan's straits, a lofty panorama of rugged mountains partly covered with dense forests, and partly with snow and ice. Some of these steamers pursue their northerly route by a labyrinth of channels and passes formed by the precipitous sides of the mountains, while those of a larger draft prefer to avoid the dangers of rocks and narrow passes, and take the outward course, in which case the traveller catches only now and then chance glimpses of the distant snow-capped ridges and culminating peaks, as the visible outline of the enormous mass of mountains known under the comprehensive term of "Cordillera de los Andes."

The whole length of the western coast-line of Patagonia, in an extent of nearly 13° of the meridian, is formed by the flanks of these mountains, and in every place where we get near it, we receive the same

* Read at the Royal Geographical Society, March 19, 1900. Map, p. 140. It is hoped to publish a more detailed map in a future number.

general impression of a wild mountainous country, difficult of access, and quite worthless for any human purpose. It is, however, prudent not to draw from such a hasty impression a premature judgment. My present object is to promote a better acquaintance with the Patagonian Cordillera, with which I have become familiar in the course of several successive journeys, having crossed its whole breadth in various latitudes, from the Pacific shores up to the elevated plateaus usually known as the Patagonian "Pampas."

In order to penetrate to the interior of the Cordillera we shall come up by the main rivers flowing to the Pacific, the valleys of which are the paths laid down by nature; we shall then climb to some dominating summits to get the best possible comprehension of the orographical conformation of the Andine system; we shall pursue our course up to the headwaters of the main rivers, and in so doing we will sometimes find our way to the very borders of the Patagonian uplands, where the Cordillera is broken and lowered into hilly undulations of inferior relative height. This course will give us occasion to learn the practical value of the slopes and valleys of the Cordillera, and to consider the conditions under which roads might be opened and settlements be developed. It will then be seen that the first and unfavourable opinion is premature, and ought to be modified; that the Patagonian Cordillera, now abandoned and in a certain respect underestimated, is not without its riches, and that there are in that region vast fields not utilized as yet, that the activity of man might easily render accessible to colonization and improvement.

As a preliminary, it may be, however, interesting to give a historical outline showing how the geographical knowledge of the Patagonian Andine region has been evolved, up to the time when the actual Chilean-Argentine boundary question originated a systematic exploration and survey of that Cordilleran region on both sides at once.

The early Spanish conquerors, who took lasting possession of Chile, displayed great interest in sending exploring expeditions towards the south, as a means to obtain accurate knowledge of the extensive mountain region, of which Magellan had the first glimpse at a distance when sailing along its shores out of the Straits down to the latitude of the Gulf of Penas. The expeditions referred to began in the middle of the sixteenth century. Captain Francisco de Ulloa, entrusted with the command of the first one, in 1553, by Don Pedro de Valdivia, and four years later Captains Juan Fernandez Ladrillero and Francisco Cortés Hojea, sent by Don García Hurtado de Mendoza, surveyed carefully, in the face of all kinds of mishaps, the shores of the great island of Chiloe, the Chonos archipelago, as well as the channels, inlets, and islands extending southwards, up to the entrance of Magellan's straits. A complete or accurate knowledge of the topography of the country could not be, of

course, expected from such explorations, but abundant and valuable information as to its general geography, hydrography, resources, and native population was obtained. The journal of the voyage of Cortés Hojea is as important in this respect as the famous Ercilla's epic poem, "La Araucana," wherein are described with profuse and accurate information the natural conditions of the island of Chiloe, as well as the customs of its inhabitants.

Geography is indebted to the famous British sailor, Sir Francis Drake, for having found out in the course of his circumnavigation (1578) the true bearing of the west coast of the triangular southern end of the American Continent. This extensive length of coast was, however, hitherto unknown in its details, and it is due to Don Pedro Sarmiento de Gamboa, whose expedition was the first to cross Magellan's straits from west to east, to have collected careful information about some parts of it, as the Gulf of Trinidad and the Madre de Dios archipelago, in 1579.

Chiloe island was from the beginning of the seventeenth century the starting-point for the parties engaged in gaining geographical knowledge about the Patagonian region. In 1609 several Jesuit Fathers settled at Castro, a village situated in a sheltered harbour of the eastern coast of Chiloe, and there they soon raised their house to the rank of a college. From the beginning the Jesuits were indefatigable in the propagation of the gospel amongst the natives of the great island, and soon extended their excursions to the Guaitecas and Chonos archipelagoes, wherein they found a sparse population of poor, submissive, and peaceful people, who did not offer any opposition to the itinerant missionaries.

Meanwhile, a rumour was current for nearly half a century, among the credulous and superstitious people of all the southern Spanish colonies, as to the existence of a country of wonderful riches, a "Dorado" phantastically assumed to be placed in the southern Andine region, this account being adorned by the most extravagant stories. This tradition went under the name of "La gran noticia de los Césares," in honour of the supposed discoverer of the place, a Captain César, a follower of the famous British navigator Sebastian Cabot. Towards 1600 a city of the Cæsars was more particularly mentioned, sometimes believed to flourish on the shores of one of the great Patagonian lakes, and others in a harbour of the North sea or Atlantic ocean. Its inhabitants were believed to be descendants of Spaniards, either the survivors from the wrecked expedition of Don Alonso de Camargo, or of the unhappy settlers abandoned at the colonies "Nombre de Jesus" and "Rey Don Felipe," founded by Don Pedro Sarmiento de Gamboa in Magellan's straits.

The tradition based on an ancient chronicle was to the effect that those settlers stranded to the north of the straits, marched along the

Cordillera as far as the latitudes of the country of the Huiliches and Cuncos, that is to say near the Lake Nahuelhuapi, by the 41° parallel. Inspired by a belief in those traditions, military adventurers at first, and afterwards zealous missionaries, went in search of that region and of their lost countrymen, with the hope of finding the "enchanted city of the Cæsars." At the time of the Spanish conquest the lake of Nahuelhuapi and the surrounding Cordilleran country were already well known to the inhabitants of the earliest towns founded in the southern extremity of the great longitudinal valley of Chile. In fact, in the beforementioned chronicle * it is related that "the cities and convents of

OSORNO VOLCANO, FROM A LAVA-FIELD NEAR THE WESTERN EXTREMITY OF LAKE TODOS LOS SANTOS.

Villarica and Osorno extended their dependencies and spiritual conquests over the eastern valleys of the Andes down to the famous Lake Nahuelhuapi." Just as in other parts of America, the European conquerors introduced several kinds of food-plants, especially fruit trees of the Old World; and it is therefore evident that the wild apple trees that are found to-day in patches at the foot of the eastern slopes of the Cordillera, between the latitudes of Villarica and Nahuelhuapi, are the living witnesses of the activity of those early settlers, who at that remote period brought with them the first germs of civilization to the southern

* The detailed early history of the Nahuelhuapi region may be seen in the introductory chapters of Dr. F. Fonck's recent book, 'Viajes de Fray Francisco Menendez a Nahuelhuapi.' Valparaiso, 1900.

valleys of the Cordillera, and even to the desert and "pampas" stretched at its eastern side.

In the year 1621 the army captain Diego Flores de Leon effected his famous journey, starting from Calbuco, crossing the Cordillera by the valley of the river Peulla, through the pass actually called Boquete de Perez Rosales, and coming down to Nahuelhuapi, where he collected information about the then numerous native population of the interior of Patagonia. One year before, the Spanish navy pilot, Juan Garcia Tao, had sailed from Chiloe in a southerly direction, navigating through the Chonos and Guaitecas archipelagoes till he found his way stopped by the isthmus of Ofqui, a very narrow strip of lowland connecting the Taitao peninsula with the mainland. A long series of voyages carried out in the same direction was thus inaugurated, some of the explorers contriving to go further south, animated by the desire to find the way to the mysterious city of the Cæsars amidst the network of channels and sea-arms cut out from the Patagonian coast, from the gulf of Reloncaví southwards.

Although most of these expeditions did not yield any positive result in advance of the topography and geography of the regions visited, there were some explorers whose charts, journals, and other information are even to-day valuable, and may be consulted with profit. The perusal of their narratives makes us wonder at the intrepidity of those early pioneers, who, with the most primitive means of transportation, defied all the dangers of a stormy sea, as well as those offered by a desert, mountainous, and inhospitable country. It is truly wonderful that, as early as 1672, the Jesuit Father Mascardi, Rector of the Castro College, could carry out a journey from the mission of Nahuelhuapi across the barren Patagonian plains, escorted by native "Caciques," and arrive at a harbour on the Atlantic coast, probably the port of San Julian, as they found there unequivocal traces of the stay of British navigators, being very likely those of Sir John Narborough's expedition, which two years before had been anchored in that harbour. Compared with the extent of Father Mascardi's long journey, the distance between the Nahuelhuapi settlement and the main mission at Chiloe sinks into insignificance, and we have positive information as to the traffic between both places being frequent and relatively easy.

Besides the route already mentioned—through the Peulla valley and across the Perez Rosales pass—there was another way without the drawback of lake-crossing, by which Nahuelhuapi might be reached in three days with mules and horses from the Pacific coast. This road, styled "Camino de Vuriloche," fell into oblivion after the raiding of the Nahuelhuapi mission by the Puelche Indians in 1717, and has only been found out again, as it is thought, in recent years.

It was not, however, only the wish of discovering the chimerical enchanted city which impelled the Spanish Colonial Government to

encourage, and the missionaries or private adventurers to effect, those journeys between the settled part of Chile and Patagonia, but also political motives. After the expedition of the Dutch corsair, Henry Brouwer, who, in 1643, raided the island of Chiloe, it was rumoured that a foreign power, either Dutch or British, had taken possession of several points of the coast south of Chiloe, and this induced the Spanish authorities to send expeditions for reconnoitring, and to make effective the power of the Spanish Crown over those remote dominions.

A voyage worth being recalled is that of the Spanish navy captain, Antonio de Vea, in 1675–76, who sailed through the Chiloe, Guaitecas, and Chonos archipelagoes, crossed the Ofqui isthmus, and sailed again across the gulf of Penas, up to the Guayanecos islands and the Fallos channel towards the 48th parallel. Although there is a want of accuracy in the latitudes recorded in that navigator's journal, there is still in it most valuable information about the physical geography of the archipelagoes and continental shores.

It is worthy of notice that all the voyages just mentioned, during the sixteenth and seventeenth centuries, began on the Pacific side, while two or three attempts to cross over eastern Patagonia to the Cordillera, and down to the Pacific shores from the Atlantic, failed, as the expeditions of Don Hernando Arias de Saavedra in 1605, and Don Geronimo Luis de Cabrera in 1622. Both explorers retreated from the Rio Negro line, yielding to the aggression of the natives.

We must now pass over an interval of a whole century in order to meet with explorations constituting a true step in advance in the clearing up of the geographical horizon of Patagonia.

One of the most interesting episodes, however, in the history of travel along the southern shores of America happened during this interval. We allude to the wreck of the British man-of-war *Wager*, belonging to Commodore Anson's expedition, and the escape of some of the crew, amongst them that of the famous admiral, Sir John Byron, then a midshipman of the navy, who, under the guidance of the natives then inhabiting those shores, effected a journey from Guayanecos to Chiloe. The narrative of this expedition, written in 1768 by Byron, a quarter of a century later, pictures wonderfully the general character of the country of the gulf of Penas, with its broken shore-line and deep fjords; although the especial conditions of the journey, in which the most tremendous hardships had to be endured, did not allow the author to attempt even a rudimentary sketch of the course followed; it is thus sometimes rather difficult to reconcile his topographical information with the actual charts of the region.

In 1767, the very year in which the expulsion of the Jesuit community from Chile took place, ended also the memorable and successful voyages effected by Father José Garcia, one of the most indefatigable of their missionaries, whose journal of voyages is replete with

interesting geographical information respecting the Patagonian lands and islands visited by him. He drew a chart of the coast-line between the 43rd and 49th parallels, wherein are shown with fair accuracy the principal inlets of the sea into the mainland, as well as the corresponding large rivers, the Palena and the Aisen, the gulf of Penas' inlets and channels, including the largest of all, Baker channel, also called to-day Calen inlet, but to which he applied the name of Estero Messier, that belongs now to a neighbouring channel.

The Spanish Colonial government were in the meanwhile mindful of the possibility of a foreign investment of their southern dominions, and to better prevent such an emergency they put, in 1768, their southern headquarters of Chiloe under the direct control of the Viceroy of Peru, who also held under his control henceforward the religious missions settled on that island.

At that time there was an advance as to the topographical knowledge of the country, mostly due to the efforts of the pilot Don Francisco Hipolito Machado, who in 1768 surveyed the coast-line between Chiloe and the Gulf of Penas' southern extremity. Besides the truly scientific descriptions contained in his reports, he determined, with fair accuracy, latitudes, bearings, and the magnetic variation of the compass; geography is also indebted to him for important sketches of the Chonos Archipelago, Taitao Peninsula, Gulf of Penas, and Fallos Channel.

It was only ten years later, after the Plata State was raised to a Viceroyalty, that attempts to settle and colonize Patagonia from the Atlantic side became more frequent and successful. The small village and fort, "El Carmen de Rio Negro," now called "Patagones," founded by the first Viceroy of Buenos Aires on the lower Rio Negro, played here the same part, as point of departure of the expeditions, as the city of Castro, two hundred and thirteen years its senior, in Chiloe, at a still higher latitude. Just then a book had been published, entitled 'Description of Patagonia,' by the Jesuit Father Tomas Falkner, as a result of his own travels and researches, made during many years amongst the natives, with whose language he had become familiar. This book, that was utilized for the drawing up of the great official map of South America engraved and published at Madrid in 1775 by Don Juan de la Cruz Cano y Olmedilla, had called the attention of the Spanish Crown to the weakness of the defence of its southern dominions in America, showing the facilities afforded to a foreign invasion by the waterway of the river Negro; this river proceeding, according to an erroneous belief of Father Falkner, from a lake distant only a two days' journey from Valdivia on the Pacific shore. As a result of the fears thus raised, small settlements were founded along the Patagonian Atlantic shore up to the Santa Cruz river, and an expedition was sent, commanded by the Royal Navy pilot, Don Basilio Villarino, instructed to explore the Rio Negro to its origin in

the Cordillera. Villarino carried out successfully his enterprise in the years 1782 and 1783, going up to the Rio Negro, then the Limay, and its northern tributary, the Collon-Cura, to its headwaters in the "manzanales" (apple-fields) country, where he sighted the snow-capped Lanin volcano, and gathered from the natives information about the surrounding country, and even about the Spanish mission at Nahuel-huapi. But, although the navigability of the Rio Negro up to the Cordilleran slopes was thus proved, it was at the same time brought to the knowledge of the Spanish Government that such a route did not afford the facilities that had been supposed for a foreign investment on a large scale, and, consequently, they desisted from further systematical explorations in Patagonia from the Atlantic side, and even caused most of the newly-founded coast settlements to be broken up.

VALLEY OF RIVER ALANSO NEAR ITS JUNCTION WITH PUELO VALLEY (LOOKING SOUTH).

This decision was maintained when the results of another expedition were known. We refer to the journey effected by the explorer, Don Antonio Viedma, who carried it out at the time just referred to. Starting from San Julian, he crossed the country inhabited by the Tehuelches at the north of the Santa Cruz river, and reached the eastern slopes of the Cordillera, where he discovered the lake that bears even now the name of that intrepid traveller. While the geographical exploration of the eastern part of Patagonia was thus interrupted, it was continued on the Pacific side, to carry out a minute topographical survey of the long extent of coast-line and islands, including the mountainous adjacent land, between 41° and 46°. This work was due to a lieutenant of the Royal Spanish Navy, Don José de Moraleda y Montero. His great spherical chart of that region, his numerous partial maps, journals of travel and navigation, must be considered as of the highest

merit when we bear in mind that Moraleda had to carry out his work (between the years 1787 and 1796) by means of rough Indian canoes (piraguas), fitted out to carry sail like a schooner. It is to be regretted, however, that such a worthy hydrographer did not acquire a correct idea as to the inland Cordillera and the valleys proceeding therefrom. As he did not seriously attempt to penetrate into that mountainous region along the shores of which he was continually sailing, he conceived a prejudiced opinion which, if accurate with respect to lengthy stretches of the sea-shore, was utterly unfounded as to the great hinterland valleys of the Cordillera. Moraleda states that no inlet of the coast is of any use as a harbour for vessels or small craft, as their bottoms are insecure for the purpose of anchorage; that there is no cultivable or productive soil in any agricultural sense; that the valleys cannot be made use of for crossing to the other side of the Cordillera; and that the rivers are not practicable as waterways, with the exception of three of them, where small boats may only enter as far as the tide. We shall have occasion, in the course of the present paper, to rectify this general opinion of the Spanish pilot, which has doubtless contributed to the Patagonian Cordillera being considered, until very recently, as a worthless country.

At the same time that Moraleda surveyed the shores of the Andine region, its recesses were reached by another indefatigable traveller, whose incursions are the last revival of those of the seventeenth century effected in search of the enchanted city of "the Cæsars;" we refer to the Franciscan Father, Francisco Menendez. After two voyages to the Ofqui isthmus and to the Gulf of Penas, and another two to Comau inlet and the river Vodudahue, where he crossed almost the whole breadth of the Cordillera in the latitude of 42° 30′, he went in four successive expeditions in the direction of Nahuelhuapi, the last of which occurred in 1794. Unfortunately, Father Menendez was not possessed of sufficient scientific knowledge to be able to draw a map of the mountainous region over which he travelled. It is therefore difficult to give a graphic shape to his not very clear and precise topographical information.

Although the apparent and official mission of Father Menendez was the investigation of "the Cæsars," he paid little attention to that fancy, and his expeditions were undoubtedly stimulated by the desire to explore new lands, to re-discover the lost path of Vuriloche, and to have friendly intercourse with the Indians of Nahuelhuapi, so as to be able to re-settle a mission at that place. We find in the journals of his expeditions the first information about the great glaciers of Mount Tronador, and that of a general kind on the orography and hydrography of one of the most intricate regions of the Cordillera.

During the first decades of the present century, as the South American colonies were absorbed in the great struggle for independence against Spain, no progress was made in Patagonian geography on

the part of the nations directly interested in it. The famous British exploring expeditions carried out in the years 1826 to 1836 by Parker King and Fitzroy with the *Adventure* and *Beagle*, opened in South America the modern era of scientific surveys, and laid the solid basis on which, even at present, rest all the minor works done on both sides of that continent.

The value of the hydrographic work carried out by those officers and their able staff is too well known for us to do anything more than mention their splendid general charts and the detailed maps of harbours and dangerous passes and narrows that had been issued subsequently. At the same time, Darwin's observations outlined in their fundamental features the physiography and geology of the southern part of the American continent. We must not forget, however, that, owing to the hydrographical character of the surveys, these were not extended farther than the foot of the Cordillera, and were never pushed inland from one side to the other. Only such prominent peaks as could be sighted from the shore or by the landing party, were put down on the maps, and no attempt was made to draw any connection between the different ranges of the mountains, no knowledge being gained, indeed, on that score. In fact, the large Andine rivers flowing to the Pacific remained unexplored, and the existence of spacious and fertile valleys in the subandine region at the headwaters of those rivers was as unsuspected as before.

As at the time when the country was under the Spanish rule, the Andine region of the lakes of Todos los Santos and Nahuelhuapi was the first to be visited and surveyed by scientific travellers. In 1852 Dr. Philippi, a noted German naturalist, made an ascent of the Osorno volcano; in 1856, Dr. Fonck, following the old path of the Jesuit missionaries and Father Menendez, crossed over to the shores of Nahuelhuapi; and in 1863, Don Guillermo E. Cox sailed on this lake and through its outlet, by the river Limay, down to its confluence with its tributary the river Traful, where his boat was wrecked, and the interposition of the natives put an end to his daring enterprise. The topographical knowledge of this region of the Andes contributed by those explorers is fairly accurate, and was completed later on by the surveys carried out in 1881 by some Argentine naval officers under the command of Lieutenant O'Connor.

With regard to the vast region called Eastern Patagonia, its general aspects and main topographical features were rendered popular by the interesting narratives of Captain Musters, who, in 1869 and 1870, travelled over from the Santa Cruz river to the Nahuelhuapi and Manzanales country, in company with a tribe of Tehuelche Indians, of whose customs he gave a most correct account. During the following decades the Argentine expeditions, led by Don Francisco P. Moreno, Major Moyano, and Don Ramón Lista, contributed new and useful information about the topography and natural history of Patagonia,

with the exception of the interior and western ranges of the Cordillera, where they did not penetrate; the survey of the great lacustrine basin constituting the headwaters of the river Santa Cruz, carried out by Major Moyano, is one of the most important results of the expeditions just mentioned, and, at the time, a most valuable addition to South American cartography.

Here, as in Northern Patagonia, where the Chilean and Argentine surveyors of Nahuelhuapi covered the same ground, it happened that in 1877 a Chilean party, under the command of the navy Lieut. Rogers, extended its surveys from the shores of the inlets of the Pacific to those of Lake Santa Cruz.

Some thirty years ago the Chilean Government undertook a detailed exploration and survey of the extensive Western Patagonian littoral, and entrusted this work to several naval officers, amongst whom Don Francisco Vidal Gormaz, Don Enrique Simpson, Don Ramón Serrano, and, recently, Don Roberto Maldonado must be especially mentioned. This is not the place to give a detailed account of the works carried out by these hydrographers and surveyors; their results have been published, with a great number of maps, in the Chilean Hydrographic Office Annual, and have been duly incorporated in the official charts issued by the British Admiralty.

Together with the foregoing we must mention the explorations and surveys carried out by the officers of the British frigates *Nassau* (1866–69) and *Alert* (1879–80), by the German corvette *Albatros* (1883–84), and others of minor importance. The whole of these combined constitute a nearly complete general map of the extensive, much-broken, and intricate Patagonian shore-line and adjacent archipelagoes; though many details and recesses of secondary channels and inlets want to be completed. It must be observed that the operations and surveys carried out by the Chilean navy were not restricted to the coast, but were sometimes pushed inland amidst the Cordillera, some of these latter explorations being worthy of notice.

Captain Vidal Gormaz was the first to publish geographical information on the lower courses of rivers Petrohue, Cochamó, Puelo, and Vodudahue; Captain Simpson explored part of the rivers Aisen and Huemules; and Captain Serrano Montaner penetrated into the Reñihué, Corcovado, and Palena valleys.

Captain Simpson's account of his expedition to the Aisen has been, indeed, through a too literal interpretation of its terms, the cause of a statement being represented as the opinion of the Chilean geographers, to the effect that the sources of this river were to be found far away to the east of the last slopes of the Cordillera, amidst the Patagonian Pampas. As a matter of fact, Captain Simpson's words are*—"It

* 'Anuario Hidrográfico de la Marina de Chile,' vol. i. p. 146.

seems that the level of the low lands rises from the Pacific up to a range of secondary importance, farther inland than the high belt (collar) of mountains hitherto called Cordillera of the Andes, but of which it is only the southern extension. The true water-parting is really effected by that secondary range (sierra) or ridge (lomo); this being the reason why some rivers, as the Aisen, proceeding from the other side, completely cut across the belt (collar) of the Andes." The actual truth is that some branches of the Aisen rise on the undulating plains into which the eastern slopes of the Andes merge; but Captain Simpson's authority should not be quoted even to prove this fact, as he did not reach or see that piece of the country, nor penetrate so far inland as he was led to believe. The enormous difficulties opposing an advance up-stream with boats in the Patagonian rivers,

NARROWS OF RIVER ALANSO (LOOKING NORTH).

the eminently variable current of which renders the reckoning of the distances so liable to mistake, as well as the unfavourable conditions for any check on the bearings or situation of the explorer amidst dark virgin forests and under an almost constantly clouded sky, that does not allow of sighting prominent peaks for identification, are circumstances much impairing the value of the maps based on such early surveys for measurement of distances. In the carrying out of more careful surveys I have had, as well as other fellow-explorers, occasion to realize that Simpson's and Serrano's distances were greatly exaggerated; Mr. Oscar de Fischer especially, who surveyed by the stadia, as a member of my expedition to the Aisen, the branch of this river visited by Simpson, found traces that he could easily identify of the last encampment of this explorer, lying a whole degree in longitude to the west of the position where it was marked on the map, and, in fact, in

the middle of the Cordillera. It may be seen, besides, in Simpson's narrative, that the information given by him as to the origin of the river was gathered from some of his boatmen or carriers (peones) sent two days in advance, and who were not much to be relied upon, interested as they were in the turning back of the expedition to the comforts of their ship.

Captain Serrano's expedition to the Palena in 1886–87 is also especially interesting. It was then ascertained that this large river is a main waterway which finds its course to the shore between powerful masses of the Cordillera from a comparatively open country, where the ground is not so rugged and the forests not so dense, the traffic of horses being consequently possible. After journeying up-stream for four weeks, Captain Serrano met at last some mounted Pehuenche Indians, and after gathering from them some information on the headwaters country, returned to the Pacific coast. Some time after, an Argentine explorer, Colonel Jorge Fontana, advanced from the Atlantic side to the point reached by Serrano, about 75 miles from the Pacific, where the Pehuenche Indians gave him the news of the Chilean expedition. This was the first time that explorers proceeding from different sides had reached the same ground in our section of the Cordillera to the south of Nahuelhuapi. Colonel Fontana had already extended his excursions over the subandine region, nearing the 43rd parallel, to the north of the Palena headwaters. He had reached a large and beautiful valley of the Cordillera, that he called "16th of October," and discovered a river named by the Indians Staleufu (Futaleufu), erroneously assumed to be the upper course of the river called Corcovado on the Chilean charts.

Colonel Fontana's expedition is also associated with the first Argentine settlement in a valley of the Patagonian Cordillera where till then only nomadic Indians had penetrated when hunting for wild cattle. By the Argentine Government's authority, a colony was founded, peopled mainly by Welsh settlers coming from Rawson, at the mouth of the river Chubut; subsequently some surrounding valleys have also been partly occupied by Argentine settlers. Chile, on her side, founded in 1889 a settlement at Leones island, at the mouth of the Palena river, and claimed against the exercise of Argentine authority on 16th of October valley, as being on her side of the watershed of the Cordillera, which line, according to the actual boundary agreement, she maintained, ought to be the frontier.

We have thus come in touch with the actual boundary question, that, apart from all political aspects, has undoubtedly been advantageous in a geographical sense for both countries involved, as an incentive for exploring and surveying vast regions of Patagonia hitherto untrodden and unknown. To realize the great progress recently made on that score, it is sufficient to compare the corresponding section of Prof. Brackebusch's map of Argentina, published in 1891, as representing the

consensus of geographical knowledge of that time, with the new general maps that contain the results of the exploring expeditions carried out by order of the Chilean Government as well as by direction of the Argentine La Plata Museum, and the basis of which are the accurate surveys of the boundary commissions of both countries. The work of those commissions embrace also much interesting information on physical geography, and has provided positive information as to the extent of useful country for settlement in that part of the American continent.

When I arrived at Santiago de Chile in 1889, under a Government contract as professor of geography and history at the State Pedagogical Institute, I soon came to understand that the broadest field for the geographical studies that I had in mind was to be found in the Andine region of Patagonia, as, besides presenting many interesting physiographical phenomena, it was called to play a preponderant part in the Chilean-Argentine boundary question. When peace and order prevailed again in Chile, after the revolution of 1891, the work of delimitation began at once, and I also carried out in the same summer season my first excursion in the south of the country, not so much intended as an original exploration to acquire a general idea of the ground, as to become familiar with the way of travelling in the region. The severity of the rainy weather, the exuberant growth of vegetation, and the extreme scarcity of resources in the Cordillera, demand of the traveller a special preparation and a minute acquaintance with a great many details concerning the people, boats and other means of transportation, loading and packing of provisions, etc. We know of expeditions that, starting from the coast in high confidence and with much display, have come to grief after a few marches into the Cordillera, simply because their leaders had disdained to inquire into the routine of those minor things on which, though they may appear insignificant at first, the success of the expedition often depends. As I am fully aware of the importance of this point, I must begin with some observations relative to the way of travelling that the local conditions of country and weather impose on the Western Patagonia explorer.

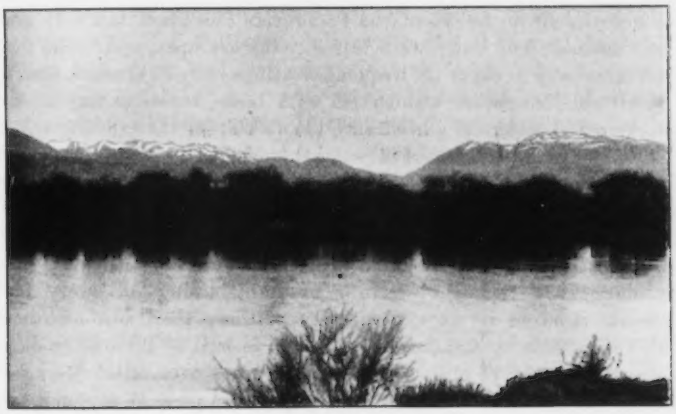
It will be readily understood that, in order to penetrate inland among such extensive mountains covered with dense forests, the best paths are those laid down by nature, that is, the valleys of the largest rivers proceeding therefrom. Thus, the first part of the journey will usually be effected by navigating up-stream in a water-course, for which purpose the expedition must be fitted with boats, collapsable, or otherwise specially adapted for the object. The rivers of Western Patagonia do not form any considerable deltas, but their mouths are barred by sand-banks, which must be located and surveyed previously, to find the main channel of the entrance. In the lower part of their course, where

the rivers meander between shallow alluvial banks carved out of the bottom of a valley several miles wide, there are no obstacles to the navigation, and there is even sufficient depth of water for steam-launches. We have had the experience of this in the rivers Puelo and Palena going up the first rapids of the latter, and may affirm that the rivers Baker, Aisen, Cisnes, and Yelcho admit of the same means of transport.

Higher up-stream, out of reach of the tides, the same rivers offer serious obstacles to navigation. Large boulders, rocks, and trunks of trees gather in their channels, and the stream forms gravel-beds, sand-banks, and islands, between which the waters flow impetuously, and over long stretches keep boiling furiously, giving rise to a high and irregular swell. The water-currents work steadily and strongly to remove these impediments, which usually form a step in the declivity of the river-slopes, so that after the rapids and turmoils there is frequently a long piece of deep and smooth water. On these sections the navigation must be effected in low-keeled slight boats fitted with four or six oars, and manned by people of well-known ability and competence in this kind of work. This class of people is fortunately found at Chiloe, the adjacent islands, and in the small villages of Reloncavi inlet; my personal experience enables me to affirm that the latter especially show an uncommon courage and ability for river navigation. It frequently happens that every attempt to row against the stream is frustrated, and if the depth of the water is not sufficient for making use of the sails, there is no other means of going forward but to tug the boat with a rope from the shore, or pull from the boat after tying the rope to a tree or rock. To effect these operations it is necessary to have at hand one or two light boats that may be sent ahead with the best men to reconnoitre the way, and tie the ropes at the convenient places. It happens also frequently that it is necessary to cross a swift current of the stream with loaded boats; the starting-point and the strength of the current must then be ascertained to a nicety, so as to reach safely a smooth place or a counter-current on the other side. There is usually no danger in effecting those movements, but such is not the case when submerged stones or logs lie hidden, liable to be struck by the boat, and thus causing a wreck in the midst of a heavy surf. On the whole, much practice and minute precaution are required for going up the rapids of the large Patagonian rivers; the men must be able at any moment to jump down into the water, and the explorers themselves have to incur the risk of an unavoidable wetting and of passing through very awkward and annoying situations. There is no doubt that going up-stream in those rivers is easier and less dangerous than coming down, when all depends on the watchful eye and cool head of the pilot, who in the midst of a vertiginous descent must see at a glance the passage through which he ought to steer the boat.

As the party advances inland the difficulties of navigation naturally increase, till finally the point is reached where these are insuperable, whether because a waterfall interrupts the river-slopes, or because of the long and uninterrupted series of rapids where the work of tugging the boats may be irreconcilable with the purposes of the expedition. The boats must then be left aside for the time, care being taken to store them away not only from the action of the sun's rays, but also out of range of the floods that frequently raise the level of the river in a few months or even weeks 12 to 15 feet.

Then commences the march on foot across the forests of the river-bank; the seamen and rowers now have to play the part of carriers and woodmen. It is of the utmost importance at this moment to ascertain the direction in which the expedition must move, by ascending to some



RIVER CHUBUT IN ALAITEN VALLEY AND THE WATER-PARTING CORDILLERAN RANGES (LOOKING WEST).

dominating summit or ridge, from which the path for several weeks to come, may in many cases be traced; many difficulties offered by the ground may in a certain way be foreseen, and many circuits or windings of the valley may thus be avoided. These ascents to high points ought to be repeated as frequently as the lapse of time available for the journey allows, as, besides the opportunities of checking his bearings, they also afford to the explorer the best occasion of acquiring a general idea about the orographical conformation of the Cordillera and other features of the region he is crossing.

The most serious impediments at this phase of the expedition are the forests covering more than three-fourths of the whole ground. The worst feature is the underbrush, chiefly composed of bamboo-canes (*Chusquea quila* and *Chusquea colihue*), fuchsia-bushes, chaura, tepú, etc.,

which grow with incredible exuberance under the shade of the high trees; the latter being beech trees of different species, ciprés, laurel, mañiu, etc. That underbrush bars the way to the travellers, who have to open their path by means of axes and "machetes" (broad and curved blades). The order of the march must, therefore, be so arranged as to send ahead a party of "macheteros," whose number must depend on the thickness of the brushwood; while this party is engaged in the clearing of the path, the rest are carrying the loads, an operation requiring usually two or three journeys of each carrier. It will be realized that, under such conditions, the advance cannot be but slow; the average of a day's journey, or say, ten to twelve hours' work, does not exceed, in fact, 2 miles in a straight line over a dense forest, and provided the ground is not too broken. The impossibility for a caravan composed of mounted men and beasts of burden to force a way through the virgin forests of the Patagonian Cordillera, is a very great inconvenience; but until well-cleared paths are open, and while there is no other way to effect the frequent crossings of swift streams, than by difficult and dangerous manœuvres with boats, horses or any kind of cattle would be more of a hindrance than a help to the expeditions. It is lucky for such parties that the same shoremen of Chiloe and Reloncavi, whose fitness and ability to row, steer, and handle a boat in a river are undisputable, are at the same time skilful woodmen, trained from early life to cut down trees, to carry pieces of wood and other heavy loads over forest footpaths that often scarcely deserve the name of such. We might say that they have a natural training for every kind of work required in an exploring expedition; their sure-footedness with heavy loads up and down steep hills, as well as through swamps; their surmounting of obstacles, crossing ravines over fallen trees (*cuicuyes*), is truly marvellous. Their foot-gear is a piece of raw hide tied to the foot, called "ojota;" beyond this, they are rather indifferent about their dress, and do not seek any particular protection against the unavoidable soaking that occurs every day. As to food, they give preference to the baked wheat flour (*harina tostada*), and to dried and salted beef (*charqui*), both kind of provisions being the most indispensable for campaigning in Chilean Patagonia.

As the journey by land is usually along or not far from the course of a large river, or by a valley where lakes occur at intervals, it is frequently convenient or even necessary to break the continuity of the march by stretches of navigation. When it is foreseen that such will be the case, as time or material to build a raft may be scarce, it is advisable to have the expedition supplied with small transportable boats, collapsable or composed of pieces that may be put together when they are to be made use of. I may recommend for this purpose transportable boats composed of two pieces, which with the oars and fittings are carried in three loads. I know by more than one experience that the

trouble incurred in carrying those boats through rough forest footpaths is fully compensated later on, when the traveller is enabled to overcome all kinds of obstacles offered by rivers and lakes in the way of the party.

When the expedition has advanced in the way just explained, as far as the region of the large subandine valleys, which lie amongst the eastern half of the Cordilleran masses, the conformation of the ground and the character of the vegetation become at once such as to allow of a more rapid march. If it is desired, then, to reach by the "Pampa" some inhabited place of Argentine Patagonia, saddle and pack horses would be indispensable; it would be found advantageous, in such a case, to get rid of the main body of carriers, sending them back with the boats to the starting-point on the sea-shore, and retaining only such assistants as are necessary for carrying the remaining loads up to the point where the horses are expected to be found. The Chilotes (the inhabitants of Chiloe island), however useful they may be for the journey with boats and on foot, are not so fit, some few excepted, to play the part of "arrieros" (drivers) or of mounted attendants for a long journey on horseback. It has been found preferable, for this reason, to get new attendants more conversant with the use of horses, as the Chilean or Argentine cowboys (huasos or gauchos). The extension of the journey over the Argentine Patagonian land requires, besides, many other special arrangements, so that it seems desirable in such cases to combine the exploring party with an auxiliary one, whose part it would be to bring to a place agreed on the necessary men and supplies.

Notwithstanding the most careful and adequate preparations, the success of an exploring expedition through the Patagonian Cordillera may be endangered by the condition of the weather, even in midsummer. Every explorer ought to be fully prepared to eventually lose one or two months as a consequence of rains or floods, so that the supplies and attendants must be calculated accordingly. From Valdivia to the Straits of Magellan, the climate of the Pacific coast is extremely rainy, the maximum fall taking place very probably about the 44th parallel. Two or three weeks' continuous rainfall are not by any means uncommon, even in spring and summer, from October to April; this rainfall extends also to the mainland, though it decreases from west to east. During my expedition to the river Cisnes (44° to 45°), for instance, we had in January and February, 1898, as many as fifty days of torrential rain, such as made it impossible to leave the camp for any surveying purpose. Then, towards the second half of March heavy snowfall began, so that it was only at the end of April, after a four months' journey, that the expedition reached the first settlement in the Argentine Patagonia. It is barely necessary to hint at the effects that such a long season of rain has on the ground; the volume and flow

of the streams are increased in an appalling manner, thousands of giant trees being carried away; every hollow and depression of the valleys is turned into unfordable mud-pools, and on the slopes of the hills landslips occur, large pieces of ground with trees and rocks being hurled down.

It must not be presumed that because the excessive moisture of the weather is the main drawback to Patagonian exploration, there is any want of inconvenience arising from opposite causes—that is, from lengthy periods of drought occurring with some frequency at the summer time. When there is no rain for three or four weeks running, the woods become extraordinarily dry, and the utmost care is required to avoid a fire that might spread to an enormous extent, and even endanger the success of the expedition itself. The "Chilotes," like the Pampa Indians, suffer from what might be called a mania for setting fire to every combustible material which they come across; they require, therefore, to be rigorously watched, especially when crossing the extensive grass plains of the subandine valleys. During my last expedition to Lake Cochrane, we were chased for three weeks by an enormous fire which had sprung up at our backs through the carelessness of our people, and, helped by an unceasing westerly wind, consumed all the grass of the hills and ravines of the southern shore of that lake. Besides the dangers arising from this source, that may threaten the camps and deposits of supplies for the expedition, there is the additional nuisance of the smoke constantly obscuring the whole horizon, and so preventing the carrying out of any surveying operation.

I hope to have succeeded in giving a fair idea of the particulars of travelling in Cordilleran Patagonia, as well as of the many difficulties attending such journeys. I may proceed now to a description, keeping to their broad features, of the orographical and hydrographical main systems forming the relief of Andine Patagonia between the 41st and 48th parallels. Besides the results of my own explorations, I have been able to make use of the information gathered by other fellow-explorers on the Chilean side, whose expeditions have also taken place in the last decade.

Proceeding from north to south, we have to deal first with a region of the Andes famous in the history of travel, which is drained partly to the west towards Reloncavi inlet or Boca, and partly to the east towards the basins of rivers Negro and Chubut. Three independent watercourses flow into the Boca de Reloncavi, the northernmost fjord of the Patagonian littoral, viz. the river Petrohue, which is the drainage channel of Lake Todos los Santos; the river Cochamo; and the largest of all, the river Puelo, which, together with its tributary, river Manso, collects the waters of an extensive region of Andine lakes.

The river Petrohue flows from Lake Todos los Santos in a south-

westerly direction on the bottom of a deep depression interposed between the granite scarps of the Santo Domingo Cordillera and the lava fields of the Osorno volcano, the slopes of which descend gently to the east and to the south. An uninterrupted series of rapids render the navigation of the river impossible for any kind of boats. The accumulation of volcanic materials proceeding from the Osorno and Calbuco volcanoes has probably obstructed the former channel of the river towards the Lake of Llanquihue, and constrained it to force a new course towards the Reloncavi inlet. The valley between the slopes of Santo Domingo Cordillera on the east, and the precipices of Cerro Tellez and Cerros Rollizos to the west, is a succession of alternate widenings and defiles resulting from the approximation of the basaltic cliffs on both sides, showing a prismatic columnar formation uncommonly regular and beautiful. The left bank of Rio Petrohue is inaccessible for nearly its whole extent; on the right there are good pasture-lands belonging to the Llanquihue settlers, which have suffered considerably from the fall of ashes and mud-streams discharged by the Calbuco volcano during its eruption of 1893.

RIVER CISNES, 10 MILES FROM ITS MOUTH.

Lake Todos los Santos, formerly called Esmeralda, because of its blue-green colour, is an Andine lake in its whole extent, its shores being formed, save a few sections of low beach, by inaccessible cliffs plunging straight into the waters. Its southern and eastern extremities correspond to two important depressions of the Cordillera; the former extends as far as the Reloncavi inlet through the basin of the small Lake Cayutue; and the latter, formed by the valley of river Peulla, reaches the foot of the Perez Rozales Pass, a main water-parting point, where a mule-track is in use for traffic between Todos los Santos and Nahuelhuapi. As in the time of the Jesuit missionaries, the first of those lakes plays to-day

an important part in the journey from Chile, especially since some enterprising traders of Puerto Montt have launched there a small steamer plying from one end of the lake to the other in two or three hours.

Going up the valley of river Peulla, which is the main tributary to the lake, we arrive at the Boquete Perez Rosales, where, at about 3100 feet above sea-level, runs the continental divide line, winding between lakelets and marshy fields which fill the bottom of the undulations of a small plateau. The pass is formed by a remarkable gap in a ridge which extends to the north-west over high hills until it merges, under the 41st parallel, into another well-defined range lying in a south-westerly direction, and to which belong some notable volcanic peaks, as the Puntiagudo, La Picada and the Osorno volcano, which form the northern boundary of Todos los Santos basin. Towards the east several ranges are detached from the dividing ridge; a south-easterly direction prevailing amongst them, and such ranges respectively coming to an end on the borders of the western and north-western arms of Lake Nahuelhuapi. Nearly all these mountain chains are partly covered with perpetual snow; but on the Argentine side the growth of vegetation is not so luxuriant as on the side of Chile, so that between the primeval forests of the lower slopes and the snow-line, a large band of bare rocks is interposed, its red-grey colour recalling to the traveller the appearance of the Cordillera in central and northern Chile.

If we follow the dividing range further south, we soon approach the lofty mass of Mount Tronador, rising on a wide base of crystallized schists, and displaying in its upper slopes the extensive fields of compacted snow (firn), which give birth to half a dozen glaciers sloping down to the north, east, and south, and from which respectively spring the rivers Peulla, Frio, and Blanco. The stately structure is crowned by three outstanding summits that, judging by some specimens collected by us, are composed of andesitic rock, their culminating point rising to 11,345 feet above the sea, according to trigonometrical measurements made by the Chilean Boundary Commission. It is worthy of notice that the continental water-parting does not take place over this highest summit, but on a secondary and easterly one, which separates the glaciers that give rise to the river Peulla on the one side and to the river Frio, flowing to Lake Nahuelhuapi, on the other. Eastwards the dividing range is parallel with the longitudinal depression or "cajón" of the river Frio, and with another andesitic range which is cut short at its northern extremity by an arm of Lake Nahuelhuapi, that being connected at its southern end with the mass of the Tronador by a transversal link, the ridge of which is flattened at the Barros Arana Pass (4636 feet), and constitutes the oceanic water-parting in its remarkable easterly deviation.

The oro-hydrographic conformation of the Andine region extending southwards of Mount Tronador is extremely complex, and the researches and explorations of some years to come will be needed to obtain an accurate knowledge of all its details. I am, however, able to indicate the prominent features of the oro-hydrographic structure of the said region, availing myself of the results of the surveys carried out in 1897–98 by the Chilean Boundary Commission, of two reconnoitering expeditions of my fellow-traveller Mr. Oscar de Fischer in 1893 and 1899, and of my own explorations in the Llanquihue Cordillera in 1893, and to the basin of river Manso in 1896.

We must say, in the first place, that, although this has been affirmed, we do not know any high snow-capped mountain range extending southwards from Mount Tronador; a deep and wide depression lies, in fact, between the slopes of that giant mountain and the semicircular range which contains the headwaters basin of Rio Cochamo. The ridge of that range culminates in the curiously shaped hill "Cuerno del Diablo" (the Devil's Horn), of some 6500 feet, near the top of which volcanic tophus with alternate layers of lava and basaltic conglomerate have been found. Between Cuerno del Diablo and the Reloncavi shores there runs from east to west a mountain range bearing in parts extensive snow-fields, its ridge, however, being sufficiently low at the passes Valverde and Raulies as to allow the possibility of communication between Cochamo valley and those of the rivers Blanco and Concha.

Cochamo valley, though not proceeding from the main watershed range, offers, however, favourable conditions for a horse-track, which, after crossing some secondary ridges, should descend to Manso valley, where the way is clear to the open Patagonian pampa. This valley is also very rich in valuable timber, especially "alerce" (*Fitzroya patagonica*) and "mañiu" (*Podocarpus* and *Saxegothea*), as well as in extensive lands fit for agricultural purposes, the cattle finding abundant food in the vast quila and colihue growths. The valley we are speaking of is confined on its southern side by rugged masses of mountains of some 8000 feet high, with extensive snow-fields, the recesses of which are still untrodden by men. The western slopes of these mountains plunge into the Reloncavi waters, while they are surrounded on their southern and eastern sides by the Lower Puelo and Manso valleys. This same mountainous mass is also cut across towards the north-east by the deep gorge of the river Morros, where the track before mentioned could be made to pass. A col 3600 feet high allows the communication between Cochamo and Morros valleys, leading thereby to the main waterway of river Manso, which is the most important drainage channel of the Cordilleras towards the latitude 41° 30′.

Between the Cochamo and Manso headwaters the Cordillera presents many narrow ridges, running most of them in a southerly direction or

with a slight deviation to the east, as the Fortaleza range, which is cut down by the Manso valley at the foot of the imposing Bastion mountains, where porphyric conglomerates have been found, while near its top strata may be seen apparently composed of volcanic tophus. All these ridges are divided from each other by deep gorges, the bottom of which is occupied by streams or lakes of minor importance; such ridges are of medium height, save some portions of the Quemado and Fortaleza ranges that rise above the snow-line.

As I have said before, there is no southerly extension of the orographic mass of Mount Tronador in the shape of a well-defined mountain chain; it is, therefore, rash to speak of a main range of the Cordillera as connecting that important mountain with any one of the ranges or ridges that terminate at the depression of Manso valley; the continuance of that orographic mass is much more apparent towards the east, where a series of ranges surpassing 6500 feet in height, amongst which the parting of the waters to opposite oceans takes place, are connected with the main mountain by the already mentioned link, the lower point of which is the Barros Arana pass. If we follow the water-parting range to its subsequent southerly bend, we have to cross a lengthy but narrow longitudinal depression, the northern half of which is occupied by Lake Gutierrez, drained to Nahuelhuapi, and a southern one by an arm of Lake Mascardi, both lakes lying at a little over 2600 feet above the sea, and being divided by an insignificant swelling of the ground. There we have what may at first appear as a very uncommon and capricious run of the main continental water-divide, but which has been ascertained in these last years to be a common occurrence, not by any means confined to the southern latitudes in the Andine system. Coming down from a high and dentellated ridge, with peaks more than 7000 feet high, the divide crosses the aforesaid depression and then goes up again to another ridge with high peaks, among which there is one called "Cerro Tristeza," nearly 8500 feet high. This peculiarity of the water-divide may be explained, in my opinion, by the greater activity of the fluvial erosion on the Pacific side, where the heavy rainfall, driven with great force by the prevailing westerly winds, combines to work in a receding direction, that is to say, up-stream, with the final result of shifting the whole divide from west to east. It may then have happened that whole basins, like that of Lake Mascardi, drained formerly towards Nahuelhuapi, have been captured towards the Pacific slopes.

I shall now give some particulars about the Puelo and Manso Cordilleras, following the same order of route as in my two expeditions undertaken in 1895 and 1896 in company with Dr. Krüger and Dr. Reiche.

The river Puelo, like all the other main watercourses of Western

Patagonia, shows the type of a non-graded slope river—that is to say, has not attained its mature or normal slope. The longitudinal section of this, between the headwaters and the seashore, does not form a regular curve, beginning with the greater declivities and exhibiting more and more gentle ones as it nears the coast. On the contrary, its upper, middle, and lower courses show independently a succession of alternating rapids, waterfalls, smooth waters, and lakes, through which the river runs. The proper lower course of Rio Puelo is only a short stretch of 5 miles between the river mouth and the beginning of a succession of large rapids within reach of the tides. Usually the river is about a quarter of a mile wide, the depth being 3 fathoms and the current some 4½ miles an hour. On both sides of the mouth

PRIMÆVAL FOREST IN THE CENTRAL CISNES VALLEY.

there are great alluvial beds, mostly formed by volcanic detritus and well wooded. Gigantic pieces of volcanic conglomerate are also scattered through the country, and it may be observed that even such of those as are well out of reach of the tides are materially impregnated with minute sea-shells, as it occurs usually with submerged rocks or with those covered by the high tide. This seems to be a sure indication of oscillations in the sea-level, that in a former period must have covered all these alluvial grounds up to the foot of the neighbouring hills. In fact, many other indications of a similar rising of the coast, such as old shore-lines, decayed sea-shell banks, etc., are frequently to be met with along all the littoral as far as the straits of Magellan.

The plains and meadows at the river-side of the Lower Puelo are

covered by many farms and wooden cottages, where some three hundred settlers, nearly all of them Chilotes, reside. They have cleared the timber to a great extent for their growing of potatoes and wheat, and their cattle graze in the neighbouring forests. Their chief business is to work in the woods. They are untiring in exploring the "montaña" (forests) behind their cultured plots in search of alerce and ciprés, that are not now usually found but in remote recesses of the mountains and at a considerable height. Sometimes they combine in small parties of woodmen, who, after finding some good place for lucrative work, go to settle near it for a summer season, build some primitive huts, and bring with them all the necessaries of life. Whole families of the more southerly part of Chiloe proceed in the same way to places near the rivers Palena, Aisen, etc., to extract from the innermost recesses of the seaside mountains their most valuable timber. The boards from the alerce and ciprés, roughly trimmed on the spot, are brought for sale to Puerto Montt, Calbuco, Melinka, or other ports of the region.

Going on now towards the interior of the Cordillera in the Puelo valley, we shall have to fight our way up the long and dangerous rapids, or go around by the southern bank between some low chains of hillocks and deep depressions, where the growth of the quila brushwood is almost impenetrable. We arrive then at the first lacustrine basin filled by the lakes La Poza and Taguatagua in the direction of the Puelo valley, at the bottom of a hollow depression amidst the Andine system.

I wish to call attention to the fact that, throughout all the Andine region with which we are now dealing, the direction alluded to, that is from north-west to south-east, obliquely to the general bearing of the Patagonian coast-line, is a predominating one in most of the main valleys, as may be observed in important sections of the rivers Puelo, Vodudahue, Reñihue, Yelcho, Corcovado, Lower Palena, Carrileufu, Cisnes, and Mañiuales. Some of the large inlets of the coast and sea-arms between mountainous islands and the mainland keep close also to the same bearing, as may be seen with respect to Comau and Reñihue inlets, Yacaf channel and Aisen inlet. This concordant disposition of the main Cordilleran depressions, as well as its parallelism with some of the most prominent and continuous Cordilleran ranges, seems to be an indication of the direction being also that of the earliest mountain system of the Andes, the more so as it is coincident also with the direction of the low ranges of primary crystalline rocks lying in the so-called Pampa Central of Argentina, and with that of the coast-cordillera ranges in Chile.*

(*To be continued.*)

* See Siemiradzki, "Eine Forschungsreise in Patagonien" (*Peterm. Mitteil.*, 1893, p. 49–62).

IN THE HEART OF BORNEO.*

By CHARLES HOSE, Resident of the Baram District.

In the month of April, 1884, I entered the Sarawak Civil Service, and was given an appointment as extra officer for the Baram district, under the Resident, C. C. de Crespigny.

This territory, which formerly belonged to the Sultanate of Brunei, had been ceded to Sarawak about eighteen months before my arrival. Promoted to be Officer-in-Charge four years later, in 1890 I was appointed Resident of the District, and have held that post up to the present time. It is part of a Resident's official work to visit the people of the interior from time to time, which necessitates tedious and difficult journeys. It is chiefly owing to these long inland expeditions that I have been enabled to observe the habits and customs of the people, and by degrees to construct a detailed map of the interior, which has taken many years to complete.

The Baram district is situated in the northern part of Sarawak, between lats. 3° and 4° 30′ and longs. 113° and 115° 30′, with an area of about 10,000 square miles, and a coast-line of 100 miles from Kidurong point to Baram mouth. On the north side it is bounded by the remaining portion of the Brunei territory and the Limbang district; on the south by the Bintulu and Rejang district; and on the east—on the other side of the watershed—by the Balungan district in Dutch Borneo.

A glance at the map will show that the Baram, which is the second largest river in Sarawak, rises from the central massif, from which the Rejang on the one hand, and the Batang-Kayan, or Balungan, on the other, take their origin. The river basin lies between long. 114° and 115° E. and lat. 2° 45″ N. and 3° 10′, the mouth of the river is practically at long. 114° E. and lat. 4° 37′ N. The following are the chief mountain masses that bound the watershed of the Baram valley, working from the east round by the south to the west. Mount Mulu, which lies on lat. 4° N. and long. 115° E, is the rugged, jagged termination of a range of limestone mountains, which sweeps round to the east and then to the south, and abuts the sandstone Pamabo range, about 10° west of long. 115°; but is probably continued in the limestone mountain masses of Batu Murud and Salaan. To the north of Mulu are the low sandstone ranges of Matauei (Madalam hills) and Ladan; east of the Mulu range is the remarkable limestone pinnacle mountain Batu Lawei, which, from a base of about 10 or 12 miles in circumference, rises sheer to the height of 8000 feet. The Pamabo range consists of a series of sandstone mountains running south-east, and bends back again to the

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* Paper read at the Royal Geographical Society, March 5, 1900. Map, p. 140.

west below lat. 3° N., forming a large amphitheatre which encloses an immense plateau, the Kalabit country, in which the Baram itself takes its main origin; on the southern slope of this range, the Bahau, the largest branch of the Balungan takes its rise. This range continues past the Panawan mountain to the Buding, Bureh, Saat and Kanawang mountains, where it divides into the Kalulong and Dulit ranges; all these mountain ranges enclose the whole of the Madang district, and constitute the watershed of the Rejang to the south and east, and of the Tinjar to the north. Kalulong is continued uninterruptedly down to the Pata hills, and Dulit through Aiah and Skiwa to Mount Selikan. The area thus circumscribed to the east, and to the north at about lat. 3° 40′, is divided by the main stream of the Baram river, at the head waters of which, as we have already seen, is the Kalabit country to the east and the Madang district to the west. The central portion is occupied to the south by the Kenyahs, and to the north by the Kayans. To the north of this is low-lying land, which is part of the great coastal plain of Sarawak.

From the coast-line to about 30 or 40 miles inland, the country is flat, swampy, and uninteresting. On account of the poor quality of the soil it is but sparsely cultivated, sago being its chief and almost sole product. Occasionally this plain is relieved by isolated mountains of lime- and sand-stone, rising to a height of 1500 feet, such as Mount Subis and Mount Lambir. In the limestone mountains, which are at no great distance from the coast, are numerous caves inhabited by thousands of swifts (*Collocalia*), the nests of which are exceedingly valuable, and are exported to China in large quantities. During the months of March and April the birds migrate, according to native belief, from the necessity of finding some particular description of food which enables them to produce the glutinous substance from which the nest is built.

The principal Government station in the Baram district is Claudetown, on the Baram river, about 60 miles from the sea. The country round about Claudetown is more hilly, and although the soil is not nearly so good as that further inland, the natives—principally Dayaks—grow fair crops of padi, maize, and yams, and the land appears to be well suited for irrigation. The country varies but little for perhaps 20 or 30 miles further inland, but the Mulu range of mountains, rising to the height of 9000 feet, and the river, with its beautiful but dangerous rapids and waterfalls, lend elements of picturesqueness to the scenery.

On November 10, 1898, accompanied by Drs. McDougall and Myers, members of the Cambridge Anthropological Expedition, I set out for the Madang country, a hitherto unexplored district, lying between the headwaters of the Batang-Kayan, Rejang, and Baram rivers, and inhabited by the Madangs, a warlike tribe of Kenyahs, who by constant raids had become the terror of all the surrounding country. The chief

things to be considered appeared to be, the distance we had to travel and the difficulty of safely navigating the dangerous rapids. As the Madang chiefs had met me on several occasions, I had little doubt that they would receive us in a friendly manner; but the Kayans who accompanied our party were of a different opinion. Many of them returned home after fifteen or sixteen hard days in the boats, making various excuses to disguise their fear of a hostile reception, which was the real cause of their desertion. On the other hand, the Kenyahs, under Tama Bulan, the most important chief in the Baram, were anxious to go right through to the journey's end, and he and about fifty of his men behaved admirably, and would not leave me till we reached home again. The Kenyah and Kayan district is lovely, undulating

LIMESTONE CAVE—HAUNT OF THE SWIFTS.

country, fertile, and covered with old jungle except in places near the banks of the rivers where it has been cleared and cultivated by the natives.

It will not be necessary to say much about the country through which one has to pass on the main river, as a paper of mine on that part of the district has already been read before the Society.* I will therefore pass over the Kayan country, and confine myself chiefly, on this occasion, to the hitherto unexplored part of the island—the Kenyah Payah, and Madang districts.

At Long Akar I had to part with my Cambridge friends, as Dr. Myers was suffering from fever, and Dr. McDougall was obliged to

* *Geographical Journal*, vol. i. p. 193.

return with him to Claudetown. The country here is mountainous, and I am told by the natives that the soil is very good. The Akar river hereabouts is for many miles a succession of rapids, very difficult and slow of ascent. As a proof of this, I may mention that the up journey takes three days, and the return or descent only four hours. The boats used for this work are merely dug-outs, about 40 feet in length and 4 feet beam, with square bows and stern. To minimize the risk of swamping when shooting the rapids, long thin planks are lashed to the sides of the boat, in the centre of which is a covered shelter of palm leaves bound with rattans, in which all the baggage is kept. The other part of the boat is wet all day, the waves constantly sweeping in as the craft is forced through them. The Kenyahs are very clever in handling these boats, and seldom meet with an accident, while among men of other tribes less skilful there is great loss of life.

It is a most picturesque sight to see a Kenyah boat slowly gliding down-river to the head of a fall, the men standing up and leisurely dipping the ends of their paddles in the water to keep the boat's head straight, and straining their necks to find the best spot to shoot the fall. Then, suddenly dropping down and paddling for all they are worth, the boat dashes into a foaming mass of waves, beaten backwards and forwards in all directions by huge boulders. The roar is deafening, and the water splashes in on all sides. For a moment one feels as if it would be impossible to get through; but the pace tells, and the boat, often full of water, by most wonderful management slips round into a less troubled part, and gives the men time to bale out and prepare for the next rapid.

On the eighteenth day of our journey we reached the Silat river, a large tributary which has its source in the Madang country. At this point a five-peaked mountain—5000 feet—called by the natives Batu Tujo, suddenly rears its crests on the sky-line, while beyond its bulk looms the 7000-feet Batu Siman, the great landmark to the *voyageurs* from Batang-Kayan river to the Baram. The river here is still a noble stream, and from the surface of its broad waters one sees that for miles around the hills have been cleared of jungle by the Kenyahs and sown with padi and native tobacco, which also yields a fair harvest to these indefatigable tillers of the soil. The Madang district which we are now about to enter is broken, hilly ground, of which the mean level is about 1500 feet above the sea. According to native account, it is the part of the country whence successive migrations have taken place. Twenty-one days out from Claudetown we arrived at Long Tabau, the first Madang village we had seen, and entered the Silat, a river of surpassing loveliness. Huge trees covered with fern and parasite plants and festooned with trailing vines overhang the water; masses of gorgeous red rhododendrons flame in the interstices; while on either side, from banks, in places towering to a height of from 20 to 60 feet, creaming cascades stream endlessly over black rocks, and, flashing like diamonds

where touched by the sunbeams, lend the charm of light and movement to a scene of extraordinary beauty. Dense groves of graceful wild sago palms clothe every small hill, and when the padi crop fails, it is on these that numbers of Kenyahs, Punans, and others depend for their means of subsistence.

Though the rapids between the mouth of the Silat and the Long Lata are not nearly so difficult of transit as those met with on the main river, they yet present many formidable obstacles to safe navigation. Vast rock monoliths rising to a height of 30 feet, stud the middle of the stream, great walls of rock projecting from either bank almost meet in the centre, and through the narrow passage so formed, the pent-up

JUNGLE IN THE KAYAN DISTRICT.

waters boil and race with such violence that the most skilful management and immense labour are required to force the boats through.

Five days later we entered the Lata river, a large tributary of the Silat. Here the rapids and waterfalls are the finest that I have met with in Borneo. So steep was the fall and swift the current, so torn and tortured the rushing water by countless obstructions, that no craft, however skilfully handled, could hope to live in such a turmoil, and we had to abandon the boats and continue our journey on foot along the bank of the river. Though the distance was only 12 miles, a day and a half were occupied in walking along the side of one rapid, which was only one of a series, so broken and precipitous is the country through which the river forces its way to the lower levels. At the head of this rapid we found a number of Madangs awaiting us with a

very small boat which they had hewn out of a tree the day before, having a few days previously heard of our advent. They invited me to sit in this boat, while, by means of rattan ropes secured to stem and stern, nine strong men—jumping from rock to rock in the most marvellous manner, swimming about in the water, and crossing the river from side to side in their erratic progress—hauled me along over huge rocks and swirling rapids, for ever warning me the while, to keep my hands inboard for fear of getting my fingers jammed against the boulders. When seated right on the bottom of the boat, it was only large enough to contain me, while my body alone acted as a barrier to prevent the water, sweeping copiously over the bows, from flowing into the stern. After about four hours of this peculiar travelling, we reached Long Purau, where we stopped for a time at a Madang village to dry our clothes and collect our property. Here, the country being more open, the rapids were much less formidable, and once more we were able to take to the ordinary up-river boats, many of the party, however, preferring to walk, as the jungle track was a good one. The following morning we passed the last rapid, the river opening out into wide reaches each of which was studded with numerous small islands and gravel beds, and towards evening we arrived at the principal Madang village.

This village, which contained about two thousand people, consisted of nine long houses forming a circle, the centre of which had been cleared of shrubs and trees. For a considerable radius outside this ring the jungle had been felled, and the land was farmed on that side which was more or less bounded by the river, the settlement, it was evident, having been laid out on a plan best calculated to resist attack. The Madangs came down in great numbers to have a look at us, and the chief, Tama Usun Tasi, invited me to take up my residence in his house. My Kenyah friends had not yet arrived, but I thought it best to go with him at once, and afterwards congratulated myself on my decision when I found that, according to custom, Tama Bulan and his followers—being unable to enter the houses until all cases of blood-money between his people and the Madangs had been settled—were obliged to camp near the river for one night. The Madangs assisted in making huts for my followers, gave them several pigs, and sent down their women laden with baskets full of rice, so no want of hospitality could be said to mar our reception.

In the evening I took a walk round the village, followed by a crowd of women and children, who appeared greatly pleased to find that the white man was able to converse with them. Then, as the crowd increased, I sat down on a log and produced a few pounds of tobacco, and the whole party were soon chatting and laughing as if they had known me for years, instead of my being the first European they had ever met. I have often noticed that the women of the Kenyah tribes in the interior are far more genial and less shy than those of others, and I believe that the

surest sign of the good faith of natives such as these, is when the women and children come out to greet one unattended by the men. The sounds of our merriment soon attracted the attention of the men, and as they strolled over and joined us in gradually increasing numbers, the possibility of any disturbance taking place between these people and mine quickly vanished from my mind.

Just across the river from where we were sitting was the graveyard, and there I witnessed a funeral procession as the day was drawing to a close. The coffin, which was a wooden box made from a tree-trunk, was decorated with red and black patterns in circles, with two small wooden figures of men placed at either end; it was lashed with

MADANGS ON A JUNGLE PATH.

rattans to a long pole, and by this means was lifted to the shoulders of the bearers, who numbered thirteen in all, and who then carried it to the burying-ground. After the mourners had all passed over to the graveyard, a man quickly cut a couple of small sticks, each 5 feet long and about an inch in diameter. One of these he split almost the whole way down, and forced the unsplit end into the ground, when the upper part opened like a V, leaving sufficient room for each person to pass through. He next split the top of the other stick, and, placing another short stick in the cleft, made a cross, which he also forced into the ground.

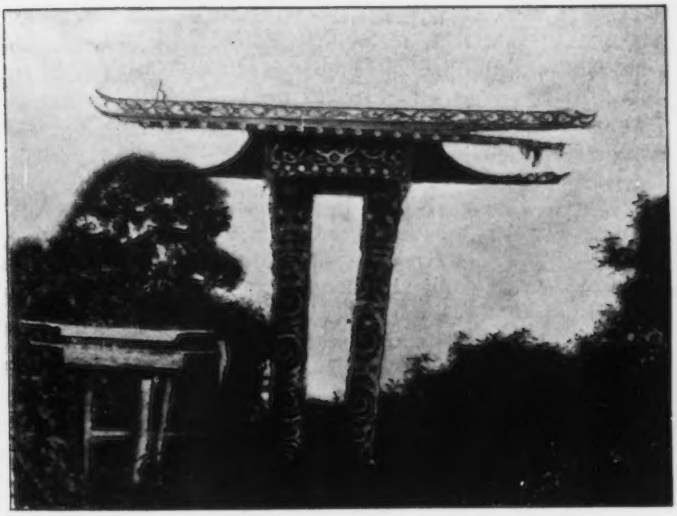
The funeral procession climbed the mound on which the cemetery was situated, passing through the V of the cleft stick in single file. As soon as the coffin had been placed on the stage erected for the

purpose, the people commenced their return, following on one another's heels as quickly as possible, each spitting out the words, "*Pit balli krat balli jat tesip bertatip!*" ("Keep back, and close out all things evil, and sickness") as they passed through the V-shaped stick. The whole party having left the graveyard, the gate was closed by the simple process of tying the cleft ends of the stick together, and a few words were then said to the cross-stick, which they call "*ngring*," or the wall that separates the living from the dead. All who had taken part in the ceremony then went and bathed before returning to their homes, rubbing their skins with rough pebbles, the old Mosaic idea of the uncleanness of the dead, as mentioned in Numbers (chap. xix.), evidently finding a place among their religious beliefs.

It is apparently a great relief to their minds to think that they can shut out the spirit of the deceased. They believe that the spirit of the dead is not aware that life has left the body until a short time after the coffin has been taken to the graveyard, and then not until the spirit has had leisure to notice the clothes, weapons, and other articles belonging to its earthly estate, which are placed with the coffin. But before this takes place the gate has been closed.

The Madangs are a very light-skinned people, with bright, dark eyes and perfectly straight, long black hair. They are fairly tall for Borneo natives, and very muscular, clean, and free of the skin diseases so common among Dayaks, Kayans, and Muruts. They are energetic and quick in their movements, splendid boatmen, and able to travel long distances in the jungle on foot without apparently becoming much fatigued. When meeting one on a jungle track, each man greets you as he passes by, with the word "Sayeh!" which means that he hopes no harm will befall you—which may be taken as characteristic of their generally courteous bearing. Their only garments consist of coats and waistcloths made from the bark of a tree known as "kumut," which is beaten out to a thin cloth with a wooden mallet. The women also use this bark cloth for their petticoats, and for the shawls in which they wrap their babies. They wear carved ear-ornaments made from the beak of the helmeted hornbill (*Rhinoplax vigil*), and also of resin obtained from the forest trees. They live in much the same manner as the other Kenyah tribes—in long houses holding thirty to fifty families in each house—but own no slaves, and the chiefs and sons of the headmen all appear to do as much work as any one in the village, their occupations including the cultivation of their extensive padi farms, and tobacco, of which they plant sufficient for their wants. They are pleasant people to meet, being good speakers—both as to the matter and manner of their orations—frank and open in their bearing, genial, high-spirited, and possessed of an abundant sense of humour. As a rule they are not polygamous, treat their women almost as equals, and are very fond of their children. They are kind and gentle nurses to

the sick, temperate, and, in a word, a good people when nothing occurs to awaken their fiercer passions. On the other hand, they are easily roused, and, when their blood is up, are ready to dare and do anything, and to fight with amazing fierceness and tenacity. But, as a general rule, their gusts of rage are but short-lived, and they are very ready to give quarter in battle. Many of these people suffer from goitre, for which they use a salt obtained from the Kalabits, as a curative; but owing to the impenetrable swamp between the two districts, they have to procure this commodity through the Leppu Modongs and others, with whom they also are on friendly terms. It is worth noting that the Kalabits, who habitually partake of this salt, do not suffer from goitre.



A MADANG TOMB.

On the following morning several parties of Madangs from other villages came in, numbering in all about six hundred, and exchanged presents of weapons with my people. It was necessary that the gods should be consulted as to whether the meeting was really in the interests of peace or not, so a pig was caught and tied by the legs, and when the Madangs had all assembled in Tama Usun Tasi's house, the pig was brought in and placed in front of the chiefs. Then one of the headmen from a neighbouring village took a lighted piece of wood and singed a few of the bristles of the pig, giving it a poke with his hand at the same time, as if to attract its attention, and calling in a loud voice to the Supreme Being, "Balli Penylong." Then, talking at a great rate, hardly stopping for a moment to take breath, he asked if

any one had evil intentions the truth might thus be revealed before the evilly disposed one was allowed to enter the Madang houses, and that if any Madang, either relation of his or not, wished to disturb the peace which was about to be made with the Baram people, let him be shown up. The old man stood waving his hands in a circle as if to cover the assembled crowd, and, jumping in the air with great violence, brought both feet down on the plank floor with a resounding thump; then, spinning round on one foot with his arm extended, he quickly altered the tone of his voice to a more gentle pitch, and, quivering with excitement, quietly sank down into his place amid a dead silence. The speech was a stirring one, and created an impression; others spoke a few words to the pig, and it was then taken to one side and stabbed in the throat with a spear, after which the liver was taken out and examined. I should mention that a pig was also provided by the Madangs for our people (who were waiting to be invited to the house) for the same purpose. Having years before studied the beliefs of the natives with regard to divination by pigs' livers, I must say I was as anxious as any one to see the results.

I saw at a glance that the omen was good, and seized the opportunity of making the most of it. I quickly called the people's attention to all the good points before they had given their own opinion, and at once saw that their interpretation was the same as my own, and that they were somewhat surprised to find it so.

I then retired to the camp of Tama Bulan and my own people, whom I found had not got nearly such a good liver from their pig, so it was decided to ask for another, which was readily given, and, this pig proving to be exceptionally good, every one was satisfied. Then two men messengers were sent backwards and forwards to discuss the numbers of people killed on either side from time to time, and big gongs, shields, and weapons of all kinds changed hands as blood-money. When all had been settled, notice was given to our people that the Madangs were ready to receive them into their houses, and our people sent a message back that they were prepared to accept the invitation.

With the Kayan and Kenyah tribes, when enemies meet it is necessary to go through a sort of sham fight, called *Jawa*, so that both parties can, as it were, blow off steam; as it is very rough for a few minutes, it often happens that some people are badly hurt, and I was half afraid that such might be the case in the present instance. But the omen had been favourable, and the implicit belief in such omen goes far to prevent bad feeling. About midday, Tama Bulan and his followers, in full war-costume, announced their intention of moving by a tremendous roar, bursting into the war-cry, which was immediately answered by the people in the houses. The noise and excitement increased as our party neared the house, and guns with blank charges were fired. On came the Baram people, stamping, shouting, and waving their weapons in

defiance, the Madangs in the houses keeping up a continuous roar. When the Baram people first attempted to enter the house they were driven back, and a tremendous clashing of shields and weapons took place, the Madangs retreating further back into the house, stamping and making the most deafening noise. When the Baram people had all entered, the Madangs once more rushed at them, and for perhaps two minutes a rough-and-tumble fight continued, in which many got knocked about. No one received a cut, however, except one man who, running against a spear, was wounded in the thigh; but the affair was quickly settled by the payment of a pig and a small spear to the wounded person, so the ceremony may be said to have ended without a mishap.

MADANGS SHOOTING WITH THE KELEPUT (BLOWPIPE).

When quiet had been restored we all sat down, and *borak* (rice spirit) was produced, healths drunk, and speeches made, which occupied the rest of the day and continued far into the night, and during this entertainment cooked food was brought out and given to the visitors in the long verandah, as, on first being received, visitors are not allowed to enter the rooms.

The next day we visited the other Madang villages, and saw many things of interest. I noticed a large wooden figure outside most of the houses, with numbers of knotted rattan strings tied to its neck, and upon inquiry was told that the figure represented "Balli Attap," a god who prevented all kinds of evil from falling on them; that each rattan string corresponded to a family, and each knot to an individual. The neck of the figure was covered with these strings. I also saw a man

making earthenware pots by a curious process that was new to me. He did not use a wheel, but built up the clay gradually, using a curved stone on the inside and a flat piece of wood slightly grooved on the outside, by means of which he produced a design somewhat resembling network, the clay being afterwards burnt in a charcoal furnace blown with bellows made of bamboo. The largest pots that came from his hands would hold perhaps a gallon, and the smallest about a quarter of a pint.

In the evening the Madangs prepared a feast for all present, and afterwards a great deal of rice spirit was drunk, and some very good speeches made, their former troubles and differences being explained and discussed in the most open manner. Each chief spoke in turn, and concluded by offering a drink to another, and singing a few lines of eulogy—the whole assembly joining in a very impressive chorus at the end of each line, and ending up with a tremendous roar as the bamboo cup was emptied.

WARRIORS PREPARED FOR THE *JAWA*.

The following day the Madangs collected a quantity of rubber for their first payment of tribute to the government, namely, two dollars per family, and as we had no means of weighing it except by guesswork, it was decided that Tama Bulan and two Madang headmen should act as assessors, and decide whether the piece of rubber brought by each person was sufficiently large to produce two dollars. It took these men the whole day to receive it all, and much counting was done on the fingers and toes. I would mention that their method of counting

is as follows: Some one mentions the names of the heads of all the families in each house, and as he does so a man tells each name off on his toes; when five have been counted, another man catches hold of the counted foot, and so on until his feet and hands have all been told off, when another man is used, and this continues until all the names are mentioned, when they halt to see how many men have been used, and where the last one ended. The people whose business it is to hold the feet and hands cling on to them in the most determined manner until the total number has been checked, and as all concerned take the matter most seriously, it is rather a comical sight when they have to count forty or fifty.

In the afternoon, the atmosphere being clear, I climbed to the top of a small hill, about 400 feet, and was able to take a number of bearings of the mountains visible, and fix the position of many of which I had taken the bearings from the head of the Tinjar river some years before. I give the position of several mountains, varying from 4000 to 8000 feet, which have been hitherto unknown. The highest mountain in this district is Mount Tebang, whose summit is 10,000 feet above sea-level. The range forms the watershed between Dutch territory and Sarawak, the sources of the Rejang and Baram rivers being on the Sarawak side, and those of the Batang—Kayan, and Mahakam—a large tributary of the Koti—on the Dutch side. In the Madang district are two isolated limestone mountains, Batu Puteh and Batu Maloi. The following are the principal peaks in the Madang and Kalabit districts, most of which can be seen from the Lata hills.

	Height.	Long.	Lat.
	Feet.		
Saat	5,000	114° 54′ 0″	3° 8′ 0″
Kanawang	5,000	114° 50′ 0″	3° 9′ 0″
Bura	6,000	114° 58′ 0″	3° 7′ 30″
Boding	3,000	115° 11′ 0″	3° 9′ 0″
Modong Bureh	5,000	115° 3′ 30″	3° 6′ 0″
Tepar	3,000	115° 8′ 0″	3° 7′ 30″
Bela Lawing	7,000	115° 31′ 0″	3° 16′ 0″
Batu Liehun	8,000	115° 39′ 0″	3° 21′ 0″
Batu Tujo	4,000	115° 2′ 30″	3° 20′ 0″
Batu Siman	5,000	115° 5′ 0″	3° 20′ 0″
Budok Batu	2,000	115° 27′ 0″	3° 22′ 30″
Budok Bayang	4,000	115° 30′ 0″	3° 26′ 0″
Bodok Wa	3,000	115° 32′ 0″	3° 28′ 0″

The country between the Madang and the Kalabit districts to the north, except for an occasional small hill, is very flat, and I am told by the natives that part of it is a large swamp extending for about twenty miles to the north and north-east. The Kalabit district is a plateau that has a general elevation between 2000 and 3000 feet. Of this the western half is an uninhabited swamp, while the eastern half is

flat and very fertile and the natives cultivate the whole of it. By means of a clever system of irrigation they obtain two crops in the year, an agricultural feat which no other natives of Sarawak accomplish.

At the level of the Lata river at Long Purau, I found we were 1876 feet above the sea. The air was fresh and pleasant, and, judging from the appearance of the people, the locality possesses a healthy climate. The temperature, though differing but very little from that of the low country during the day, dropped considerably at night, and was, we found at times, quite cold.

On taking our departure from the Madang country, most of the women presented us with a small quantity of rice for food on our homeward journey, but as each little lot was emptied into a large basket, the giver took back a few grains so as not to offend the omen birds, who had bestowed on them a bounteous harvest, by giving the whole away to strangers. Presents of considerable value were given on both sides, and all parted the best of friends. The two principal Madang chiefs accompanied us for a day's journey, their followers carrying the whole of our baggage. On parting I promised to allow a similar peace-making at Claudetown, at which most of the Baram chiefs would be present, and I am glad to say was able to arrange for it to take place and to secure an assemblage of six thousand people, during the time that Dr. Haddon and the members of the Cambridge Expedition were staying with me. The ceremonies of the peace-makings, though of course on a much larger scale, were similar to that I have described at the chief Madang village. At one of these meetings Saba Irang of the Madangs made a very eloquent and remarkable speech, in which he explained that his people had for years been compelled to fight on all sides in order to hold their own, but were now fully able to appreciate the benefits of peace under the Sarawak Government, and of friendly intercourse and trade with the peoples of the Baram and surrounding districts—a condition of things which he would do all in his power to strengthen. As a matter of history, the Madangs have from time immemorial been at enmity with the people of the upper waters of the Rejang, Baram, and the Batang Kayan, but now the Sarawak flag flies in the Madang country, and over two hundred Malay traders have gone there during the past year. Large quantities of jungle produce are being worked by the Madangs, and these very people, once so hostile to all, are now being used as a means to bring about friendly relations between our people and the border tribes.

It is only a few months ago that I received a message from Tama Kuling, the principal chief of one of the most important border tribes of the Batang Kayan, accompanied by a clod of earth, symbolizing the identity of his people with the races of the Baram. The message he sent (translated literally) was to the effect that his people were really the same as the Baram people, and that they were on the same soil.

They had been divided and made enemies on account of mistakes and the foolishness of unimportant headmen, but he was anxious to meet the Baram people and glad to make peace. He intended visiting us at Claudetown, and if the Baram people wished to trade with the inhabitants of his district, he would be responsible for the former's safety during their sojourn in the Batang Kayan. This is a practical demonstration of the benefits accruing to trade by the settlement of blood-feuds, and it was to endeavour to bring peace to communities whose normal condition was one of mutual hostility, that the journey I have attempted to describe was chiefly undertaken. It was a great source of satisfaction to me to have so thoroughly succeeded in my object, but

PUNANS AT HOME.

another pleasure—perhaps the greatest pleasure one experiences in travelling among barbaric peoples—was to have seen and met an interesting race in their natural state, using their home-made implements and weapons, and wearing their simple clothing of bark, before the appliances of modern manufacture and the cotton goods of England and Germany have penetrated their solitudes, and in a sense vulgarized by removing them, if by only one step, from their unaffected primitive condition. It was also a great gratification to behold for the first time a new and unknown country, with all its wealth of natural marvels and scenic beauties, of which even an eloquently written and detailed description would convey but a very inadequate idea.

The fauna of the Baram district is exceedingly rich in all branches,

the most important mammals being the maias or orang-utan, the lemurs, cats, otters, bear, porcupines, the rhinoceros, wild pigs, wild cattle, deer, and *pangolin*. Among small mammals are found bats, shrews, rats, and squirrels; while round the coast one meets with dolphins, porpoises, and dugongs. Of birds, Baram has nearly five hundred species, including many kinds of thrushes, flycatchers, swifts, cuckoos, barbets, hawks, owls, pigeons, pheasants, and herons.

The rivers abound with varieties of fish, and tortoises and crocodiles —the latter in undesirable profusion, in spite of the rewards (36 cents per foot measurement) offered by Government for their capture and extermination—are to be met with in their waters. Over seventy species of snakes exist in the Baram district, but notwithstanding the fact that several of the varieties are poisonous, it is a rare event to hear of fatalities as the result of snake-bite. In the jungle —which teems with insect-life, including many beautiful examples of mimicry—we find orchids of the most exquisite description, gorgeous rhododendrons, and the most lovely ferns and pitcher plants.

It may perhaps be of interest to give some figures with regard to the trade of Sarawak, for, though in themselves of less attraction than some other details I have touched upon, they assist in building up a conception of the country. In 1888 the value of the total trade of the country amounted to $3,957,750, and in 1898 to $9,174,898, an increase of $5,217,148 in the ten years, or equal to over 130 per cent.

The figures for the principal articles of export in 1898 were as follows:—

	Quantity.	Value.
Gutta	3,745 pikuls* ...	$275,738
Rubber	3,725 „ ...	367,014
Rattans	35,699 „ ...	189,291
Gambier	30,845 „ ...	171,346
Pepper	18,890 „ ...	736,760
Sago flour	251,200 „ ...	756,275

The total imports amounted to $4,488,497. The revenue of the country in 1898 was $638,188.68, and the expenditure $543,506.56, leaving a surplus of $94,682.12. The revenue increased over that of the previous year by $73,399.35, and the expenditure by $39,405.88.

Large works have recently been erected by the Borneo Company at Bau for the purpose of working gold by the cyanide process, the value of the output averaging about £200 a day. Antimony and cinnabar are also worked with excellent results. A factory for the purpose of making cutch—a dye produced from the bark of various mangrove trees, which abound in almost all the river deltas, has of late been very successful, and supplies added proof of the valuable and practically inexhaustible

* A pikul equals 133⅓ lbs.

resources of the jungle, and the rewards that await all who know how to turn them to account. The natural resources of Sarawak are enormous, and, provided the present system of government continues, are alone sufficient to ensure the future prosperity of the country. For the present the jungle furnishes the natives with all the raw produce necessary for their domestic needs and for purposes of trade, with the minimum amount of labour. But as the more accessible tracts and districts are worked out, the natives will be compelled to leave their beaten paths and penetrate into the denser wilderness, and, by making new tracks and clearings at a greater distance than heretofore from the established coastal and riverine settlements, will automatically open up the country and greatly facilitate the work of the prospector. Judging from known indications, this process is likely to result in important discoveries of new sources of mineral wealth, for the density of the virgin forest covering the greater portion of the country has up to the present time prevented anything like exhaustive investigation.

The two good coal-mines at present being worked in Sarawak are important factors in its industrial welfare. They add to its political value by enabling the territory to become a maritime coaling-base, and will greatly assist in the working of minerals and in the various processes to which most crude products have now to be subjected.

Another benefit accruing from the opening up of the jungle and the gradual exhaustion of jungle produce, will be the greater attention given to the magnificent timber with which the country abounds. Some of the most rare and valuable woods in use at the present day grow in profusion in Sarawak, but, owing to the causes lightly touched on above, have not received due prominence, though the present exportation of timber from the Rejang district is considerable, and is increasing year by year. Three facts with regard to the industrial population are attracting attention at the present time, one being the gradual but certain worsting of the Malay in trade by the Chinaman; secondly, the rapid extension of the Dayak northwards to the Baram and Limbang rivers; thirdly, the immigration of natives of Hindustan.

Unless present indications are falsified, it would seem that in time the Malay is bound to disappear as a factor in the industrial life of the community. In all directions we see the industrious, sharp-witted Chinese merchant displacing the Malay from his former avenues of trade, and while emphasizing the many intellectual and amiable qualities of the Sarawak Malay, it must be admitted that his ingrained dislike for sustained effort in work of any kind, his want of energy and foresight, and his tendency to live a life of indolence, and to rest satisfied on inherited or too easily earned gains, are the chief causes of his rapidly decreasing prosperity.

The present system of Government, which may be said to have taken for its text Sir James Brooke's famous utterance, "We aim at the

development of native countries through native agency," viewed from that standpoint, has, I consider, more than amply justified its existence.

The various races of Sarawak are for the most part gifted with considerable intelligence, and it did not take them long to discover that the main object of the State's solicitude was, not the commercial exploitation of the country or the amassing of colossal revenues, but the preservation and well-being of the people themselves, and that coercion was a dead letter for all save the disturbers of the general peace and the enemies of the commonweal. Since that belief was firmly established, native public opinion has always been on the side of the Government, and it is on the moral force of that public opinion that the whole framework of the system rests. So appreciative are the natives generally of the peace and security enjoyed by the Rajah's subjects, that many of the border tribes, and even tribes definitely beyond the confines of the territory, have from time to time petitioned to be allowed to take up their abode under his flag.

It is the Government policy—once a respect for law and order is instilled into the native's mind—to interfere with him as little as possible as regards his (harmless) customs, habits, and beliefs, and no attempt is made to foist Western civilization on a people for whose needs it is utterly unsuited.

As compared with more recently founded states and colonies, Sarawak may appear to make but slow progress, both in regard to material prosperity and what many regard as the desirable advancement of the natives. It should be emphasized, as regards the former, that no comparison is just that is instituted between Sarawak and any territory in which the well-being and preservation of the native inhabitants is not made the first and foremost consideration; with regard to the latter, it comes to a comparison of different points of view as to what *does* constitute desirable advancement.

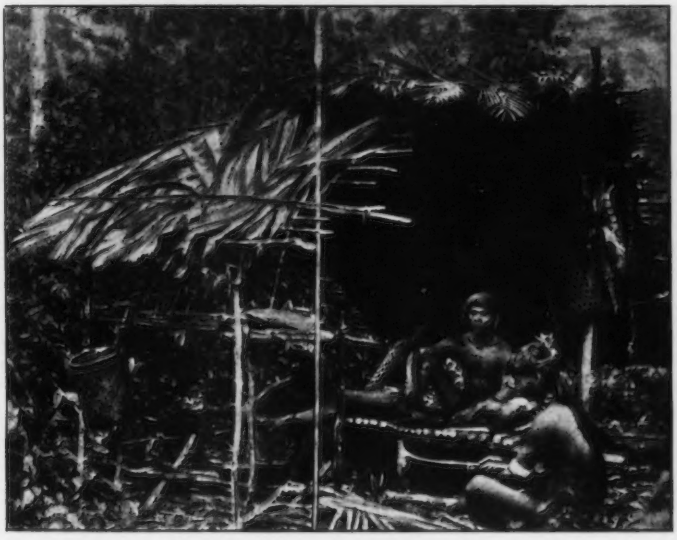
As to the wisdom of the point of view obtaining in Sarawak, the existence of the administration furnishes conclusive evidence, for it is a government of the people for the people by Europeans, supported by public opinion; such a system would be impossible, however, were it not for the firmly established prestige of the Europeans, and this, and the fact that the confidence of the natives has been won and retained by an unbroken record of promises fulfilled and benefits bestowed, are the secrets of this administration.

Very little is known about the geology of the mountain ranges of the interior of Borneo, but it appears as if most of these mountain chains and their spurs are composed of crystalline schists; these are the rocks usually spoken of as "old slate formations," which are probably of Devonian age, but some may be Archæan, while others may belong to those Lower Carboniferous rocks that are called the culm-measures by

some authors. Associated with these are igneous rocks, mainly granites and diorites, and also gabbros and serpentines, but these latter appear to belong chiefly to the spurs. The older crystalline rocks are very generally gold-bearing.

It is probable that the great amphitheatre of sandstone mountains that commences with the Pamabo range and forms the southern watershed of the Baram basin—to divide at Mount Kanawang into the Kalulong and Dulit ranges—is composed of Palæozoic sandstones, probably of Lower Carboniferous age. Granite and basalt occur on the southern flanks of Dulit, and antimony has recently been found there.

The mountains north of this sandstone range are most probably



DAYAK GUTTA HUNTERS.

carboniferous limestone; their culminating point being Mount Mulu, which attains a height of 9000 feet. The Mulu range is somewhat crescentic in its general trend, being open towards the east. Beyond the Pamabo range are the mountainous outliers of Asi, Batu Murud, and Salaam. The isolated mountains in the Madang country, Batu Puteh and Batu Maloi, are connected with the same system. The intermediate mountain ridge which culminates in Mount Tamuduk (4000 feet) is of sandstone formation, as it has the characteristic even skyline of the sandstone mountains of these parts, so different from the peaked contour of the limestone mountains.

The hard blue carboniferous limestone contains characteristic fossils

in scattered localities, and occasional seams of coal. The sandstones also contain coal in places, as, for example, in Mount Dulit. The rocks are traversed by numerous calcite veins and by ore-bearing veins, which generally contain antimony. Slates are also interbedded with the limestone, and perhaps also with the sandstones.

No secondary formations have been described from Sarawak, though Jurassic and Cretaceous rocks occur in Dutch Borneo.

To the north again of the carboniferous limestone mountains are sandstone hills, which range up to 1000 feet in height. These are Tertiary rocks, which Verbeek now regards as belonging to the Eocene. Where they occur in Borneo they are usually of a white or yellow colour, and contain flakes of a silvery white mica; the cement is argilaceous. They are probably derived from mica-schists. Alternating with them are bands of shale, carbonaceous shale and coal. In many places they are pierced by intrusions of basalts and hornblende-augiteandesites, accompanied with deposits of tuffs and volcanic agglomerates.

These coal-bearing Tertiary sandstones extend north of Mount Mulu through the Matauei and Ladan ranges as far as Mount Pisang on the coast, beyond Brunei, where coal is now profitably worked.

On the Madalam and elsewhere in the basin of the Limbang are limestone rocks, which must be regarded as Tertiary coral reefs.

Towards the plains the Tertiary hills diminish in size and, speaking generally, the limestones are succeeded by bluish-grey clays and shales and marls; the percentage of lime in these beds increases as a whole from below, upwards. The marl beds are regarded by Verbeek as Oligocene, and as equivalent to the Nari group of India.

The marls are succeeded by late Miocene limestones; these are hard rocks, whitish or bluish in colour, usually containing numerous fossils, especially nummulites.

The Quaternary beds constitute the great coastal plain, and were deposited during the last partial submergence of the island. In part they form flat districts, in part gently undulating plains.

The highest bed consists of a somewhat sandy clay, which becomes more sandy below, the sand grains at the same time increasing in size. The lower conglomerates consist mainly of quartz pebbles, but also of pebbles of different igneous rocks; they also contain pebbles of the Tertiary strata, such as sandstones and coral limestone. Between these pebbles there is more or less of a clayey earth. The pebbly bed may be indurated by a very hard siliceous cement. The bedding is horizontal, or, at the border of the hill-land, only slightly inclined.

The river deposits are composed of a dark-brown, black, or bluish clay, which is rich in humus in its upper layers; in the lower layers it is of a harder consistency. It is often mixed with or traversed by seams of sand, the latter, as a rule, occurring on a lower level. The

boundary with the older Quaternary cannot be sharply drawn. The alluvium on the Baram extends for nearly 100 miles from the coast.

Baram Point is rapidly extending seawards owing to the alluvium and drift-wood brought down the river, and the sand heaped up by sea. During the last fifteen years half a mile has been added by these combined agencies. For a distance of about 8 miles from their mouths most of the river-banks in the Baram district are composed of white sea-sand.

Before the reading of the paper, the PRESIDENT said: The subject before you this evening is a journey into the very centre of Borneo, a mountainous country that has never before been explored. It is not necessary to introduce Mr. Hose to you, as he gave us a very interesting paper I think in 1893, which many of you will remember. Major Darwin, the secretary, has kindly undertaken to read the paper for Mr. Hose.

After the reading of the paper, the following discussion took place:—

Prof. HADDON: It was exactly a year ago that my colleagues and myself had the pleasure of being the guests of Mr. Hose. You have seen the photographs of the country and the people, but I think it is only fair I should say something that Mr. Hose could not very well say.

It was sixty years ago that Sir James Brooke took over Sarawak, which was then a small territory, handed over to him by the Sultan of Brunei. Since then the Raj has grown, and it has grown, not by acts of aggression on the part of Rajah Brooke and his successor, Sir Charles Brooke, but by a perfectly natural growth: as Mr. Hose has pointed out, the natives appreciate such a government as that Rajah Brooke offers them. When Sir James Brooke made it his business to administer the country, it was for the natives and by the natives, and it is by that equitable system of government that the country has grown practically without bloodshed and without ill-feeling on the part of the natives. The native chiefs of the Sultanate of Brunei have time after time asked Mr. Hose to persuade the Rajah to take over their territory, and even the Sultan of Brunei himself asked Mr. Hose to help him in suppressing local rebellion; so that the last native state now in Borneo is, from the Sultan downward, asking the Rajah of Sarawak to administer them. Furthermore, the people on the Dutch side have seen how the people of Baram can live in peace and safety, and how they can trade securely and not be cheated by the trader—that is, not unduly cheated—and these people, really technically Dutch, are coming over the border in order to put themselves under the administration of Mr. Hose. Well, I think that is sufficient testimony from the native point of view. The natives themselves, when they first come in under the Government, never refuse to pay the tax, which is very slight—a couple of dollars. It takes a man a very short time to get enough jungle produce to exchange for a couple of dollars. They prefer to pay the tax, because then they can feel they are citizens of the Raj, they really do belong to the Government, and barbarians are by no means fools. They know well that by paying two dollars a year they will have peace, be able to trade, and have all the advantages of a settled Government, and they feel it is really a good investment for their money.

The only things the Government puts down with a firm hand are murder and head-hunting and theft—that is practically all; the natives may retain all their own customs, their religion is not tampered with. I may state that in the whole of Baram, 10,000 square miles, there are only two white men—one is Mr. Hose, and

the other is the assistant magistrate, quite a young man. There are about twenty or thirty Dayak fortmen or police. These people themselves are only one degree from barbarism, and at any moment would like nothing better than to go on the war-path and collect heads; so, as a matter of fact, there is extremely little physical force behind Mr. Hose. It is perfectly evident that this system of government is one which appeals to the natives. Of course they have troubles in the district, and if any of the interior tribes do a little head-hunting, Mr. Hose starts away by steamer as far as it can go; then takes to canoes, and when he reaches the people he simply talks to them. They usually give themselves up or pay their fines—400 to 500 dollars for a life taken. What surprises the natives is Mr. Hose's activity. He never loses a moment; when there is difficulty, he rushes up at once with only a few fortmen; still the people feel he is a man they cannot tamper with, and they give in. It is moral rather than physical force. The people who in the past were inclined to give the greatest trouble are at the present day the staunchest upholders of the Government. Now, districts like these, of course, require many different qualities, and Mr. Hose has entirely taken up the spirit of Rajah Sir James Brooke. Some of the residents—residents are magistrates who rule districts—are merely magistrates in the ordinary sense of the term; that is, they go from the residency to the fort and administer justice, and then go back to the residency. Strictly speaking, of course they ought to travel about; some do to a greater or less extent, but I believe no resident has performed this travelling function of a magistrate to the same extent that Mr. Hose has done. The consequence is, the people look on him not only as the representative of government, but as a personal friend. Now, all the magistrates must learn Malay, and a few learn the chief language of the district in which they happen to be, but Mr. Hose speaks six or seven languages. This, of course, is a very important matter; you can never get at a man's heart if you speak through an interpreter. It is only by knowing the language of a people that you can get at them. Thus, owing to his wonderful energy and enthusiasm for the natives, he has travelled all up and down his district, and knows personally the greater number of natives in his district. They come to him with all their little troubles. For instance, if a young man wants to get married, and is not quite sure whether the heads of his family would approve, he goes and confides in Mr. Hose. I saw a very amusing instance of this when I was with him. Mr. Hose spoke to the headmen and made the customary presents, fixed the matter up, and the young people were made happy. Time after time promising young natives come down on a visit to Mr. Hose, and stay with him for days or weeks at a time, and in this way the people learn what a white man, a respectable white man, is like, and what a government really means. Thus Mr. Hose's residence is a sort of university, whither the pupils come from all parts of his district to learn a little as to the meaning of government. Of course, when they go back they talk about the glories of the fort, of the Chinese bazaar, Mr. Hose's house, his piano, his musical box, and his collections. They are impressed with the power of the white man, and in all these various ways the heart of the people is reached, and they feel it is a privilege to have the white man with them.

I think I have said enough to show what is the system of government in Sarawak.

Lord STANMORE: I have never been in Borneo, I have never even sailed within sight of it, and therefore it may seem a very forward and improper thing for me to meddle with this discussion; but though I have never been in Borneo, I have lived with and governed people who, like those whom Mr. Hose has told you of, wear bark cloth, and live in their primitive manner. When you talk of bark clothes, it

sounds an uncomfortable and scratchy sort of garment, as it would be if of the bark of an English tree; in fact, they are soft and nice; they are beaten out until they make a kind of cloth of greater or less fineness. I do not know what kind of bark is used in Borneo, but in the Pacific it is a bark of a species of mulberry.* By living among them, I learned something as to the way in which they should be governed, and it afforded me great delight to hear to-night that that great province of Sarawak was being governed on what I believe to be the only true and sensible plan of governing native races. According to the words which Mr. Hose quoted from the Rajah, Sir James Brooke, it is a government for the people and through the people, though they need guidance and supervision. I wish merely to express that satisfaction, and my firm conviction—a conviction as strong now as it was when I first tried to apply it in Fiji—that this is the only way in which you can get a moral hold over the native population, and the only way in which you will preserve them. You may advance them gradually on their own lines in their own way; you won't advance them at all by endeavouring to make them something which they are not, and which they never can be. But I feel that these are discussions which rather belong to another place. They are not geography, and cannot be said to be exactly on the lines of this meeting. I merely wish to say with what extreme pleasure I have heard what is the system of government in Sarawak, and I hope it will long continue.

Dr. Bowdler Sharpe: I should not like the opportunity to pass without testifying, on behalf of the British Museum, to the extraordinary efforts to advance science that have characterized Mr. Hose's residence in Borneo. He has crowded into our museum enormous series of mammals, birds, insects, shells, and every kind of animal. Not only has he given to the British Museum the firstfruits of his work during his sixteen years' residence in Borneo, but there is not a leading museum in the whole world that has not received collections from this indefatigable young man, second only to those given by him to the British Museum, and these donations have proved of great importance to the countries he has benefited. I would just like to say one word as to the country you have been hearing about, and I think I can put the scientific results of Mr. Hose's exploration in a few words. When the late John Whitehead, the great English traveller and collector, went—in 1887, I think, or somewhere about then—to try an ascent of the great mountain of Kina Balu, in the north-west of Borneo, it took that man, great traveller as he was, four years of steady perseverance before he could induce the natives to have confidence enough in him to attempt to get up the mountain, because they were afraid of the spirits of their ancestors, and the dragons that inhabited the top. At last he gained the confidence of the natives, and when he went up he discovered fifty-six new kinds of birds. Then came another great traveller-naturalist, Alfred Everett, who lived for thirty years in Borneo, the predecessor of Mr. Hose in the great work he has done. He died last year, thoroughly worn out from the sufferings he had so patiently endured in the cause of science, and leaving behind him an imperishable name. Both achieved great results, but one of the most extraordinary things as regards zoology was the exploration of Kina Balu by John Whitehead. When Mr. Hose began to make collections in the Baram district, he also found many great mountains, as you will have seen from the map, which he made it his business to explore, and he has opened up a most extraordinary fact—that is to say, that when you look at the line of the Himalayas, and then at the map of Borneo, where you have Kina Balu and Mount Dulit, Mount Kalulong, Batu Song, etc., although there is such

* *Broussonetia papyrifera.*

an amount of sea in between, the birds at least of Mount Dulit and Kina Balu are Himalayan. It is a most extraordinary fact that the line which marks the fauna of the Himalayas from 3000 feet altitude is carried into the mountains of Western China, through Siam and Tenasserim, down the Malay peninsula to the high mountains of Java, Sumatra, North-West Borneo, to Celebes; and now during the last few years, in the high mountains of the Moluccas, you have still this extraordinary Himalayan element above the 3000-feet level, which looks as though at one time it was possible for all these to have formed one continuous chain of mountains, and that circumstances have occurred which have separated them by depressing the valleys, and so they are, as it were, isolated ranges which belong to the same system. I was talking to you the other day of the same phenomenon with the Mackinder collection and the mountains of Africa, where you have the high mountains of Kilimanjaro, Kenya, Elgon, Ruwenzori, and the Cameroons, isolated peaks standing up from the lower country, where you get an identical fauna above the 3000-feet level.

The PRESIDENT: It now remains for us to pass a vote of thanks to Mr. Hose for his interesting paper. The country he has described to us, Borneo, is of great interest to us, as it was to our predecessors in this Society for more than half a century. In our youth most of us read the story of the acquisition of the sovereignty of Sarawak by Rajah Brooke, one of the most interesting and fascinating in our history, and we have probably most of us read the story of Sir Henry Keppel's work in conjunction with Rajah Brooke in H.M.S. *Dido*, in a book which was published much more than half a century ago. I regret that Sir Henry Keppel is not a member of this Society; his brother, Lord Albemarle, was one of our founders, a father of the Society, and for many years on the Council, so that we may, perhaps, be allowed to look upon Sir Henry Keppel as a sort of uncle to the Society.

I have just heard the remarkable fact that this venerable officer has returned to have another look at the scenes of his exploits in Borneo, and has travelled there at the age of ninety-one in H.M.S. *Hermione*, but that when the *Hermione* was about to return to China he refused to go back in her, because he wanted to have a further look round. I am sure the meeting will heartily wish a pleasant visit to Borneo to that splendid old naval veteran, and a safe return to this country before he reaches his ninety-second year. Since his time we have been able to watch the progress of discovery, and within the last ten or fifteen years we have had papers from the late Mr. Daly and Mr. Hose, and now another and more interesting paper from Mr. Hose, after visiting the mountains and highlands of the region in the interior of Borneo, which had never been before explored. I think it a very fortunate circumstance that Mr. Hose should have been accompanied on this occasion by Prof. Haddon, so that a pure and most interesting race of people, uncontaminated by commerce and intercourse with any other tribe, should have been carefully measured by so eminent an anthropologist. I understand that, in order to induce the natives to allow themselves to be measured, he assured them he was ascertaining the length of their lives; no doubt he gave each a very long life to encourage the others. We have to thank Prof. Haddon for giving us an insight into the extremely valuable and important administrative work being done in that region by Mr. Hose, and we must all feel admiration for the solitary Englishman who is doing so great a work among the natives. I am sure you will all wish me to return a very warm and cordial vote of thanks to Mr. Hose for his most interesting paper.

A JOURNEY FROM CHESTERFIELD INLET TO GREAT SLAVE LAKE, 1898-9.*

By DAVID T. HANBURY.

With the object in view of crossing and exploring that portion of the Barren Northland of Canada which lies between the head of Chesterfield inlet and Great Slave lake, I left Winnipeg by first open water in the early part of May, 1898. The starting-point for this journey was Fort Churchill, on the west coast of Hudson bay, which was reached on July 6, after an easy canoe journey *viâ* Norway House, Oxford House, and York Factory. To my disgust, and very much to my surprise, I now learnt that it would not be possible to start north by open water until July 20, the earliest date, in average years, when navigation opens on Hudson bay. Two Cree lads, whom I had engaged at Oxford House to accompany me on the journey, and who had gone through the farce of signing contracts to remain in my service faithfully for the period of one year, now pleaded sickness as an excuse for wishing to return to their homes. The whole way along, I knew very well that by every one we met they had been dissuaded from undertaking the journey. Pictures of hordes of cannibal Eskimo devouring raw human flesh had been placed vividly before their imaginations by other Indians, one and all of whom have a dread of approaching "Husky" or Eskimo land. The lads were finally so overcome with horror and dismay at the mere prospect of getting anywhere near such terrible savages as the Eskimo, that I fancy they really were sick from sheer fright. Anyway, men in this condition would be of little service to me. The contract was off, and they returned in a hurry to their people at Oxford House. The Hudson Bay trading boat was to start north for Marble island about July 20. An average trip would take ten days. This would have landed me within 60 miles of the entrance to Chesterfield inlet about August 1—too late in the season, in my judgment, to commence a long journey into an altogether unexplored country. After due consideration, I decided to postpone the journey, and content myself with taking up the canoe, and leaving it in cache near Marble island till the following spring, for I intended to leave Churchill in the spring, and haul up as far as possible on the ice with dogs and sleighs.

The short summer was passed in taking a run up in the Company's trading boat, caching the canoe near Marble island, and in learning as much about the Eskimo—their language and the country to the north—as my time permitted. At the same time I managed to secure from them two trains of fine Eskimo dogs, as it now became necessary for me to take the winter trip to Winnipeg in order to refit and complete my outfit. Before leaving, arrangements were made for Eskimo (or

* Map, p. 140.

Huskies, as I shall in future call them) to meet me at Churchill in the following spring. Two sleighs were also ordered to be made, and other outfit got ready by the time I expected to be back, and on September 5 I bade farewell to Churchill for the winter, no one, I knew very well, expecting to see me return. That concerned me not at all, so long as they got everything in readiness for the projected journey. From Churchill to York the distance is 180 miles, very much more easily accomplished by land than by water.

A delay of six weeks occurred at York, waiting for the "freeze-up," during which time, as soon as the snow fell, I broke in my dogs—several of them never having been hitched up in harness before. On November 8 Hayes river was frozen solid, and as a large amount of snow had fallen, by the advice of my guide, a start was made for Oxford House *en route* to Winnipeg. Travelling in the early winter on the first snows is never good. However, Winnipeg was reached in about a month, delays having been made at Oxford House and Norway House in order to rest the dogs. The distance from York Factory to Winnipeg is something under 800 miles. The latter part of December, January, and most of February was passed in civilization. A fresh outfit, ordered from England, had duly arrived, and was awaiting me, and two reliable Red river half-breeds were engaged for the journey.

Shortly before my departure, when everything was in readiness, I happened to be one of the unfortunate guests at the Manitoba hotel, which was completely destroyed by fire one night in the early part of February. I was fortunate enough, however, to save my instruments, cameras, rifles, guns, etc.—in fact, everything which was necessary for the trip, and only my clothes went up in smoke.

On February 26 a final start was made from Selkirk. Horses and sleigh were used as far as Berens river (about halfway up Lake Winnipeg), where my dogs and drivers met me. A few days' delay at Norway House, Oxford House, and a week at York Factory to rest my dogs, and I appeared once more on the scene at Churchill—the first week in April. The spring was luckily a very late one, so there was no immediate necessity for hurrying away from Churchill, which was the last place where supplies could be obtained. A short distance north from Churchill the barren land commences, and no fuel can be got. The weather continued very cold, the thermometer frequently registering from $-10°$ to $-15°$ Fahr. The Eskimo, or Husky, who had so faithfully promised to return and meet me, had as yet shown no signs of putting in an appearance. Five weeks were passed at Churchill, the monotony of the life being broken by the occasional arrival of Huskies with loads of venison. A few Chipewyan Indians turned up, relating miserable stories of starvation during the winter months. The Huskies brought welcome news about the deer (caribou), which were reported to be very numerous all along the coast. I may

here mention that the success of the whole journey, not my own particular one, but any expedition into the Barren North land, depends entirely on the presence of deer in sufficient numbers along the route.

The season had now arrived for us to move on, if we wished to have good ice to travel on as far as Chesterfield inlet. The Husky not having turned up, I engaged another Husky in his place—"Milook," who agreed to accompany me as far as I wished, and who was capable of acting as guide as far as Marble island. We left Churchill on May 12 with two sleighs, twelve dogs, and four men, including the writer, all told. I took the precaution to haul a canoe along—for in the event of the polar bears having demolished the one left in cache near Marble island—not an unlikely contingency—we should have been placed in a decidedly awkward situation, being unable to return on the ice, and having no craft in which to proceed by water. Several nights' dried meat were taken for ourselves and the dogs, by which time we hoped to be amongst the caribou, or deer, as they are more commonly styled. A large supply of tea and tobacco, and such articles for trading with the natives met with *en route*, as knives, files, beads, thimbles, needles, awls, etc., were included in our outfit. Supplies, such as flour, bacon, sugar, etc., were dispensed with altogether. We were to depend henceforth on our rifles, guns, and nets to supply us with food.

Marble island was reached on June 5, and here we found the canoe intact, just as it had been left the summer before, so the spare canoe was quickly broken up to supply some much-needed fuel. Travelling on the ice along the coast had on the whole been very good, and our progress, though slow, had been steady. Deer had been very scarce, and the dogs had starved several nights. The deer, which the Huskies had reported as being so plentiful a few days north of Churchill, had all moved away inland, and only their tracks remained when we passed.

Many times did I deplore the folly of leaving Churchill with such a small quantity of dried meat. At one time it looked very much like having to beat a retreat back to Churchill, hauling our stuff on hand-sleighs. Fortunately, a few deer were met with and killed, just in time to save us from such an ignominious course. I should hardly have dared to have shown my face back at Churchill, forced to turn back for a second time.

We had a great friend in the weather, which, with the exception of one blizzard, had been absolutely perfect—clear, bright, and cold. Those who know the climate of the Hudson bay may well be surprised. Such a long spell of glorious weather as we experienced the whole way up to Chesterfield inlet, and again up the inlet itself, has rarely been heard of before. As far as Marble island, the ice had not shown the slightest sign of breaking up, and the surface of it was as dry as in mid-winter. I thought several times of my two Cree lads from Oxford House. If they had been along now, it would not have been possible

for them to have turned tail. There was no retreat now, for by this time the rivers to the south would be breaking up. We were burning the bridges behind us, so to speak.

The entrance to Chesterfield inlet was reached on June 8. The ice was still good to travel on, though the sun's power was commencing to show its effect, and numerous pools of water which lay on the ice had to be avoided if possible, otherwise splashed through. The weather continued perfect. It was hardly possible to believe that we were on the Hudson bay, a worse climate than which it would be difficult to find. Deer were shot as we wanted them, though at times they were not so plentiful as might have been wished. Still, there was no starvation either for ourselves or the dogs. Hunting delayed us a great deal, but large supplies of provisions would have delayed us very much more. In fact, it would not have been possible to have hauled up a sufficient supply of "outside stuff," *i.e.* flour, pork, sugar, etc., to have lasted the trip. As it was, my own and every available dog at Churchill had been requisitioned for the two sleighs. Obtaining a supply of meat would sometimes cause a delay of three days. Failing to sight deer on the first day would necessitate a second day being spent in hunting, and a third day was then required for hauling the meat. I used to shoot six or seven animals at the same spot, if possible. These would last us three days, when another halt would have to be called for hunting. Geese, ducks, ptarmigan, and other spring arrivals in the shape of small birds, hawks, loons, gulls, etc., began to appear at this time.

What at one time, in fact the whole way up, had caused me no little anxiety—viz. starvation on Chesterfield inlet while waiting for open water—now seemed very remote. The head of Chesterfield inlet was reached on June 21. During the latter part of the way up, travelling on the ice had become very bad. At one place the ice was so rough and hummocky, that the dogs' feet were cut to pieces, and I almost despaired of getting any further on the ice. By retracing our steps a long way, we managed to travel along the shore on the rafted ice, and so avoid the worst of the hummocky ice, which, when once we passed, gave us no further trouble; the ice became smooth again, and remained so until the head of the inlet was reached.

The last few days we had to travel in water the whole time, which was from 1 foot to 2 feet and over in depth, as it lay in large pools and small lakes on the ice. On several occasions some of the smaller dogs were actually swimming, and still trying to haul. The ice on the inlet was still 3 to 4 feet thick, but the snow, except in patches, had all disappeared from the Barren Ground. At the head of the inlet, some of the Baker Lake Huskies were met with. They appeared to be in a very starving condition, deer in the vicinity being very scarce, and they were without nets of any kind.

On June 23 a short portage was made over to Arkok, which is the

Husky name for the deep bay of Baker lake which lies just to the south of Bowell island and the outlet from Baker lake into Chesterfield inlet. The canoe was hauled over by the dogs on bare ground, but all the stuff had to be packed over on our backs, the Huskies lending a willing hand. Arkok, on Baker lake, was reached on June 27, and here we were delayed for several days waiting for open water. We were then able to launch the canoe and kyaks, and proceed along the narrow strip of water which had already opened between the ice and the shore. At Arkok our nets kept us well supplied with fresh-run salmon, which average in weight from three to ten pounds. Following the south shore of Baker lake, the mouth of the Kazan river was reached on July 12, and here another delay of five days was necessary, the ice ahead on the lake being compact and solid. I now wished to obtain a supply of dried meat to take along in case of emergency. Deer, although fairly plentiful, were very difficult to get near, owing to the plague of mosquitoes, which was now at its height. The animals never remained quiet for a single instant. I managed always to kill enough for our immediate use by some very long range shooting. The flesh of the deer at this time was far from being palatable, and it was hardly fit to eat, being streaked with blood and foam all through. The marrow—a former luxury—was now of the consistency of blood and water, the inevitable result of "fly-time," the wretched beasts being kept on the dead run day and night.

Baker lake is some 60 miles in length east and west. The head of it was reached on July 19. More of the Baker lake Huskies were met with at the head of the lake, at a place called King-ak, which is a deep bay to the south of the river flowing into Baker lake from Schultz lake. These natives were delighted to see "kablunak," or white people, again, and a present of tobacco completed their happiness. They willingly gave us assistance over the portage to the river, thus saving us going back a long distance and then round in order to reach the mouth of the river. Tracking the canoe and kyaks up the river for two days, Schultz lake was reached. Schultz lake and Aberdeen lake to the west of it are well known, and call for little notice. On Aberdeen lake, which is of considerable extent, we were delayed several days by head winds, and on one occasion were beset by ice, which even at this late date—July 31—had not all disappeared. However, by availing ourselves of every chance, and by travelling by night instead of by day, good progress was made. In the matter of light, the nights were now almost as clear as the days. Frequently I used to start to hunt deer at midnight.

At the head of Aberdeen lake deer were met with in large bands. They were now on their annual migration to the south. From now on, we never "hunted" deer—it was not necessary; they could have been shot with a pistol from the tent door; one could almost catch them. Fish—large trout, whitefish, a few salmon, arctic trout, and one or two other varieties—were taken by the nets in large quantities. In one night

a single short net took over 100 lbs. weight. This was indeed a land of plenty, flowing with fish, deer, and small game.

On August 3 the mouth of the Doobaunt river was reached and passed, and we entered the Ark-e-leenik river (the Thelewdezeth of Back), which flows in from the west and joins the Doobaunt river. Large quantities of driftwood were found on its banks, for this river (Ark-e-leenik) is well wooded further west. Hitherto we had depended on moss and small heaths to provide a fire for cooking purposes.

We had now entered the unexplored country. How far west the Ark-e-leenik river would take us, whether it was navigable or not for canoes, were problems which we had come to solve. There was no information to be obtained from the Eskimo, for none of them had ever ascended the river for any distance. So without guides and without supplies of any kind, we started into this unknown country, trusting to our rifles and nets to provide us with a living, and to the good fortune which up till now had come our way. The journey eventually turned out to be so absurdly easy, that I more than once regretted that it was so, for half the pleasure of exploration is derived from meeting and surmounting difficulties, *i.e.* providing, of course, they can be successfully surmounted without abandoning most of one's stuff on the way. The main Ark-e-Leenik river was explored for a distance of 182 miles, and the western branch of it was ascended for 117 miles. The divide between the waters of the Hudson bay and Great Slave lake and the Mackenzie river was crossed at an altitude of 1394 feet, a short distance beyond which we reached Clinton Colden lake, and our journey of exploration was safely accomplished. The Ark-e-Leenik is a fine large river about 300 yards wide, having an even steady current of from 4 to 5 miles an hour. For the entire distance of 182 miles which we followed the main river, there is not a sign of any rough water which could possibly be misinterpreted into the meaning of a rapid, and it is navigable for a steamer with considerable draught nearly the whole way. About 50 miles from its mouth, wood (spruce) of fair-size growth is to be found, and the woods then increase in size and extent until the river divides, the larger branch coming in from the south, the smaller —which we followed up—joining from the west. The western branch, which was ascended for a distance of 117 miles, has numerous small and some large lakes on its upper waters. This branch of the Ark-e-leenik, although not free from rapids and rough water, presented no difficulties worth mentioning; a few portages of a mile in length, one of 3 miles, and several smaller ones, and the large peculiar-shaped lake dotted in on most maps is reached.

We had long since left the limits of Huskyland, and were now (the upper waters of the western branch) well into the hunting-grounds of the Yellow Knives and Dog Ribs from Great Slave lake. Musk-ox were met with in large numbers on the main Ark-e-leenik river. There is a

stretch of country about 80 miles in extent into which no human being enters. The Eskimo do not hunt so far west; it is likewise too far distant for the Yellow Knives and Dog Ribs from Slave lake to enter. To penetrate this country in the dead of winter would be simply to court starvation. The deer have all departed, and to depend on finding musk-ox at the end of the journey would be risky indeed, for not enough meat could be hauled to see the party safely back through the barren and deserted country which would lay behind them. There still remains, I am happy to say, one spot in this Great Barren North land—which is sacred to the musk-ox—into which human beings dare not enter. Here the animals remain in their primeval state, their solitude undisturbed by the hated sound and sight of man. Long may they remain so. The musk-ox were quite tame, and exhibited no fear, only curiosity. I approached several herds within 30 yards, photographed them at my leisure, moving them round as I wished, and then retired, leaving them still stupidly staring at me in wonder and amazement. When deer were not procurable—and several times we seem to have run out of them altogether—a musk-ox was killed. Fish were plentiful all along the Ark-e-leenik; in fact, I never saw such a grand river for fish. The nets were rarely set, however, when meat was procurable, as it caused considerable delay in the morning, and the nets had to be dried. Moose are to be found on the main Ark-e-leenik, also black bears. On the western branch the woods decrease in size and extent as one ascends, until finally at the height of land there are none, and once more we had to fall back on moss and heaths for fuel. Deer were then very scarce, and the musk-ox we had long since left behind, but something always turned up to keep the pot boiling. One day it would be a wolverine, another time a fat wolf; all animals appear to be good on the Barren Lands, or is it that one's appetite is good? An occasional goose was shot, ducks, ptarmigan, an arctic hare; we always had enough, anyway, and one soon ceases to be particular as to exactly what kind of an animal it is which satisfies one's hunger.

We had the good luck to meet the Eskimo from the arctic coast on the Ark-e-leenik river, who resort to this river to obtain wood for their sleighs. These natives had never set eyes on a white man before, and had no articles of civilization whatever. They were all dressed in deer-skins, and armed with long bows, arrows, and spears, beaten out of native copper. The use of tobacco was quite unknown to them, and firearms they had only heard about. They gave me a good deal of information about their country and the copper deposits along the arctic coast, and I obtained from them several copper implements, such as dags, spear and arrow heads, needles, etc., which were all beaten out of native copper, giving them in exchange knives, files, and needles, which last appeared to have by far the most value in their eyes. They exhibited no signs of fear at our approach. They were a jovial lot, and

camped with us that night. In the evening they sang together, rather nicely, I thought. The next morning we parted, with many signs of friendship on their part.

On Clinton Colden lake, a very incorrect Dominion Government map in my possession was the cause of our going close on 100 miles out of our way. From Clinton Colden lake to Fond-du-lac on Great Slave lake, the geography of the country is well known, if not very accurately surveyed. On Artillery lake we struck the green spruce woods again about halfway down, and there we bade a final farewell to the Barren Northland, over which we had journeyed for well-nigh four months, and which had treated us so hospitably. The river flowing from the foot of Artillery lake into Great Slave lake is only passable for canoes the first 5 miles or so, beyond which distance the river descends torrent fashion through a deep precipitous chasm to Great Slave lake.

We had made several short portages on the unlucky day of the disastrous canoe accident, and already it was getting on for camping-time. In letting the canoe down a small side rapid by a bow-and-stern line, the stern line parted, and the tail of the canoe was quickly swung out into the current. In an instant it was caught by the rapids, and the bow line wrenched from the grasp of the man who held it. It all happened in a second. A cry of despair from one of my men, and we ran wildly down the river in the vain hope of the small craft being caught by some side eddy, and so brought close enough to the shore to get hold of. It shot the first rapid broadside on, even survived through the second without capsizing. A faint gleam of hope sprang up in my breast, but only for a second. A glance ahead down the river quickly dispelled any such hopes. The waters ahead, toward which the small canoe was being hurried, were all white, one broad expanse of seething foam, from which the tops of black rocks protruded in ominous fashion. The next time I lifted my eyes to look, the canoe was being tossed about, bottom up, amid one sea of foam, and the stuff, such of it as floated, was being swept away down to the rapids below in scattered directions. My heart sank; everything we possessed had disappeared—all gone! Rifles, guns, nets, axes, instruments, cameras, collections of geological and botanical specimens, note-books, and my precious photos, the result of a whole summer's work irretrievably lost! Even the canoe itself was soon lost sight of, and we were left with absolutely nothing but the clothes we stood in, still staring vacantly at the raging river which seemed to hold us with a certain fascination. My first impulse was to feel in my pockets for matches, and to my joy I discovered nine dry reliable wax matches, each one of which was good for a fire. This meant nine nights' fire, anyway. To cut a long story short, the canoe was eventually recovered, also a box, in which were my note-books and diaries containing the record of the journey, and a few other things. The loss of the geological and botanical collections,

on which I had spent much time and trouble, I particularly regret; the loss of an exceptionally interesting collection of photos I deplore.

By the loss of the rifles, guns, and nets, we were now without the means of procuring food, and were in the middle of a very rough country. Deer were plentiful, and stood stupidly staring at us within easy range; fish were leaping in the pools on the river, but the means of killing deer or taking fish were gone. Not an enviable situation in which to find one's self, and a very disastrous finish-up to an otherwise successful and most enjoyable journey. For six days we lived on what cranberries and blueberries we could find. We then fell in with the Yellow Knives, many of whom I knew. From them I obtained some dried meat, sufficient to take us to Fort Resolution on Great Slave lake, where we safely landed on September 25. At Resolution we heard all about the Great Slave Lake Mining bubble, which had finally burst, leaving many, I am afraid, richer in experience, if not in pocket. There still being a chance of reaching Athabasca Landing by open water, I availed myself of it, only remaining at Resolution a couple of days to get some very necessary clothes and footgear. A fresh start for the south was made on September 28, but we only reached as far as Red River post, 35 miles north from Fort McMurray, when the ice stopped us on October 17. The rest of the journey was accomplished with dogs.

APPENDIX.

Geological Data.

June 5.—Rocks at Eskimo camp, near Marble island, large outcrop of dark green schists; fragments of white quartzite along the shore. North of this, for some distance, no rocks *in situ*; fragmentary rocks scattered around were gneiss of varied colour, mostly light grey, containing black and white mica in large quantities. These specimens were smoothed and rounded, and have evidently been transported.

June 8.—Small island off the coast, about 5 miles south of the entrance to Cape Inlet: rocks *in situ* grey gneiss, cut in different directions by veins of red or flesh-coloured granite, dipping east at a low angle. Wag island, composed of light grey gneiss and some darker coloured, containing hornblende horizontally lying, well smoothed and grooved by glacial action; no striæ observed, but the ice moved over this part in a south-south-east direction; vegetation on island very scanty.

June 10.—Neck of land connecting Variety point with south shore of Cape Inlet: similar gneiss, horizontally bedded, cut by veins of granite; smoothed and grooved, but no striation. Hill to the south on mainland, similar formation; dip almost vertical. On the top of hill, an extensive heap of loose, smooth, and rounded boulders, and stones of gneiss (terminal moraine?).

June 12.—Large island in Cape Inlet, bearing west-south-west from Dangerous point: gneiss associated with red granite; in places huge blocks upheaved and thrown out of place by frost action; beds dipping west at an angle of 45°. Point 80 miles west of Dangerous point; coarse-grained gneiss with granite; dipping at angle of 40°. Other places in Cape Inlet have been noticed in Mr. Tyrrell's report.

June 26.—Arkok (a bay to the south of Bowell island): first signs of sandstone (red) formation, fragmentary only; no rock *in situ*.

June 27.—West point of Bowell island, between south outlet of Baker lake and

Arkok: large outcrop of sandstone; conglomerate; very little sandstone pure. The conglomerate contains quartzite pebbles, some very large, very hard to break with an axe; dipping south-west at various angles. Fragments and large slabs, some with ripple-marks of pure red sandstone lying around, and shares composed of sandstone *débris*. No other formation *in situ*, but scattered fragments and small boulders of gneiss chiefly.

June 30.—South shore of Baker lake, opposite Maur-en-ik-nak. Exposures appear a short distance inland, in the form of large oval-shaped mounds, which cap the small hills rising from the undulating grass-covered flats. Specimen 4, obtained close to camp from rock *in situ*, a schist, apparently, though the rock has rather the character of a fine or medium grained thin-bedded gneiss, of a dark grey or greenish colour, breaking easily when struck with an axe, with a slatey cleavage; the rock is cut by veins of white quartz, and blotched with same; surface of rock smoothed and rounded; dipping west-north-west at an angle of 50°. Another specimen, also numbered 4, from further inland: a small exposure, surface of rock much disintegrated by frost; no sandstone *in situ*, but abundant evidence of this formation existing in the vicinity, from the number of rounded stones lying around everywhere; the small circular gravel terraces, as seen everywhere on the Barren Land, much in evidence; broad and extensive low ridges, generally flat-topped, on which are piles or groups of stones; small beds and banks, and lying around on gravel surfaces between the numerous large and small lakes are shells innumerable.

July 3.—Took specimens of shells, which here, head of Arkok, form the subsoil, or, rather, a bed of these shells, from 1½ to 2 feet thick, underlies the thin layer of soil, which supports a growth of moss and grass. This bed of shells extends continuously for over a mile from the shore, perhaps further. For 6 miles distant they were still to be seen at the edge of and between small lakes—in fact, everywhere where the ground was not covered by a growth of moss and grass. They were observed at a height of about 100 feet from the lake. (Specimens of these shells and a few rock specimens will be sent out from Churchill.)

July 5.—From head of Arkok, west-north-west along Baker lake: more extensive oval or mound-shaped exposures of similar rock, which now assume the character of ridges descending abruptly to the shore; land beyond flat, with low shores, covered with sandstone *débris*. Sixteen miles west-north-west from head of Arkok, at the mouth of a small river: exposure of red or reddish-brown sandstone in bed of river, extending for 80 yards north and south, and about 25 yards east and west; beds 1½ to 2½ feet thick, dipping west at an angle of 8°. This exposure is 6 feet below the east bank of the river, is smooth and striated, striæ trending south. One mile further on, small mound or oval-shaped outcrop of red sandstone close to the shore, surface much affected by weather.

July 9.—Proceeding along south shore of Baker lake, numerous exposures of red sandstone along the shore. At 9 miles there is an extensive area about half a mile long by 250 yards wide, covered by a throw of smallish flat angular-shaped pieces of sandstone, which lie in the form of regular layers, or steps, as they slope towards the shore. Surely these parts could never have been swept over by fields of ice? A curious rocky exposure of red sandstone close by, the jagged surfaces of the beds projecting perpendicularly. Difficult to ascertain the dip, but the beds facing north are perpendicularly broken off. A short distance further on, sandstone beds dip south-west at an angle of 42°. Two miles inland mound-shaped sandstone hills; with the exception of these, land is dead flat, with numerous lakes scattered around.

July 11.—Along south shore of Baker lake to mouth of Kazan river: no rocks *in situ*; sandstone boulders and *débris* abundant.

July 12 *and* 14.—East side of mouth of Kazan river: no exposures; loose

boulders, gravel, dirt; shores sandy. Several miles to the south Kazan river cuts through a range of hills. Did not have opportunity of visiting them.

July 15.—West side of mouth of Kazan river: land extending from shore for 2 miles inland, dead, flat, and dotted with small lakes innumerable; then rising to a height which gives it the appearance of a long low ridge, as viewed from away east; sandstone beds here showing. Wherever sandstone formation exists, the land flat or slightly undulating, and grass-covered.

July 16.—Ascended rising land in form of a ridge, which lies to south-west of the mouth of Kazan river, which has an altitude of from 300 to 400 feet above the level of the lake. Exposure of sandstone on summit of ridge, which has the appearance of a rather altered rock. Dip difficult to determine; all that could be seen were small pieces of rock projecting perpendicularly. Surface of the main bed which showed was smoothed and rounded; terraces, semicircular or rim-shaped, at summit of ridge, composed of angular and irregular shaped fragments of sandstone, some of it differing from that *in situ*.

July 21.—On the portage between King-ak (which is a deep bay to the south of the mouth of river flowing from Schultz into Baker lake) and Koo-ook (which is the name of the river itself), which we struck 2 miles up from its mouth, we passed over several low ridges, all felspathic granite, cut by veins and associated with quartz; beds horizontally lying. Distance across portage, 5 miles.

July 22.—Travelled 14 miles up Koo-ook. Granitic formation; this granite in some places contain hornblende, in others it is of a felspathic character, the felspar occasionally being very much in the ascendant. Ridges, which run parallel to river on the south side and about one mile distant, all similar, cut by narrow veins, and associated with white quartz, occasionally in large quantities. Exposures numerous; beds mostly horizontally placed; smoothed and grooved. North-east side of river not examined, but more rocky than south-west side.

July 23.—Proceeding up Koo-ook. Scattered fragments along the shore, giving evidence of a new formation in the vicinity, which we struck after travelling 4 miles—a greenish or grey-coloured schist, having a very slatey cleavage. Large exposures along ridges south-west of the river; general dip of beds nearly vertical. A short distance further on, this rock is cut by a vein of white quartz 10 feet thick, and in many places by smaller veins. At 13 miles the river cuts through this rock to a depth of 80 feet; the rock on south side is deeply grooved by glacial action. A short distance inland, large slabs have been uplifted from the matrix by the action of frost, and are left sticking up, resembling large slabs of slate upended.

July 24.—Went on 7 miles up Koo-ook. Rocks similar schists, at one place dipping south-east at an angle of 60°.

July 25.—Reached the rapids near east end of Schultz lake after travelling 2 miles. Just above the rapid, granitic formation again. Similar, although varying slightly in character, to the rocks on King-ak portage. One outcrop appeared to be a granitoid gneiss. Extensive exposures on both sides of river. Dip of beds at one place north 25° W. at an angle of 40°. East end of Schultz lake, granitoid gneiss; 10 miles up the lake on north side, and a short distance inland, exposure of very coarse-grained red or brown sandstone. On the top of these beds, and also near by, rested some huge circular chunks of conglomerate, in which were embedded large quartzite pebbles, some of them the size of a man's head.

July 26.—Delayed by heavy head winds; took a walk back from camp, *i.e.* north-east. Rocks, conglomerate predominating, containing usual quartzite pebbles. A few exposures of red-brown, very coarse-grained, quartzitic sandstone.

July 31.—East end of Aberdeen lake. Rocks *in situ*; conglomerate and sandstone, thick and horizontally bedded. Proceeding along north shore as far as

Kek-ek-tellig, white sandstone *débris*. (Kek-ek-tellig, by the way, is where the Doobaunt river enters Aberdeen lake.)

August 3.—Between Kek-ek-tellig and mouth of Doobaunt river. Boulders on the shore very varied, granitic predominating; also some of gneiss, greenstone, angular quartzite, conglomerate, sandstone, etc.

August 5.—No rocks *in situ* until to-day at noon, when we were 33 miles up the Ark-e-leenik (Thelew) river: outcrop of fine-grained, purply coloured sandstone, dipping north 15° E. at an angle of 30° in bed of river; surface of rock much jagged and broken. It occurs on north-east side of river, and is of considerable extent; the high-cut banks, between which the river flows, are of sand and loam; outcrops of rock on hills some distance away to the south-east, probably sandstone.

August 11.—No rock *in situ* until to-day. We have been passing through a very flat and occasionally undulating country, without not even a small hill in sight. It is evidently sandstone all through. Red and white sandstone *débris* scattered along both shores. Exposure of white sandstone, very thin and horizontally bedded, in the bed and on both sides of river, extending for about 200 yards (this would be about 94 miles up the Ark-e-leenik river).

August 12.—Camp about 120 miles up the Ark-e-leenik, 2 miles above our camp of last night. Horizontally and thick-bedded red sandstone, well shown in precipitously cut bank on west side of river, and similar exposures were seen at a dozen or more different places passed to-day. Some of these cut banks exposed the sandstone beds to the depth of 50 feet; they occur on both sides of the river. Stratification well shown in many of them. Near camp of last night, outcrop on the top of a small longish, low hill, east of river, appeared white—probably white sandstone, but possibly limestone; small fragments of the latter noticed on the small circular terraces not far distant. Did not have an opportunity to visit the hill. Twelve miles up the river from camp, many large loose boulders piled up by the ice on east side of river; some of them beautiful specimens of granite, others of gneiss; greenstone noticed. But the large majority of the boulders were of a kind of hardened shale, surfaces of which were a dullish white and resembled limestone on the outside; in form they were mostly angular, but the edges were smoothed and rounded.

August 13.—Continuing up the river, we passed on the east side of the river an exposure of thin-bedded, horizontally placed red sandstone, deeply and distinctly scored, striæ south-east; parts of the surfaces bore ripple-markings.

August 16.—About 170 miles up the Ark-e-leenik river, approaching a range of hills of moderate height, which it entered through a short gorge after we had travelled 4 miles. An almost precipitous hill, about 600 feet in height, confines the river on the left-hand side at this spot, the lower part of which is one confused mass of large, loose white sandstone fragments, which have fallen and slipped from above, where the rock is *in situ*, horizontally bedded. A spur or ridge from this hill or peak extends up the river for some distance, and is of the same formation. Character of country beyond gorge extremely sandy, the sand being beautifully white. About 7 miles beyond the gorge the Ark-e-leenik river divides, the larger branch cutting its way through thick beds of horizontally lying, red and white, chiefly white, sandstone, and flows off in a south-east direction, the smaller branch, which I followed, taking a south and changing course. I shall refer to this now as the west branch of the Ark-e-leenik. A hill lying to the west between the gorge and the forks, a typically glaciated sandstone hill.

August 17.—We now ascended the main Ark-e-leenik river for a distance of 182 miles. Proceeding up the western branch, white sandstone formation very evident, river cutting its way through thick beds at several places. At 3 miles from the forks a fall of 5 feet, white sandstone beds horizontally placed exposed;

half a mile beyond, a fine fall of 30 feet; horizontal beds of white sandstone cut precipitously for a distance of 150 yards. Rock appears to be very soft, and easily crumbles; surface on east or north side of fall, near the edge, well smoothed and very distinctly striated, striæ S. 20° E.

August 18.—At last we come on a change from the everlasting sandstone, which formation continues the whole way up the Ark-e-leenik river. At about 12 miles the western branch cuts through a thick bed of gabbro (?), which extends in the form of a deepish gorge for 200 yards; this rock is very massive, beds dipping south at an angle of 60°. Rock varies in character, some of it having the appearance of a foliated rock on the outside. Quartz very much in the ascendant in some cases; biolite in others. In places the rock is largely composed of a flesh-coloured stuff, with only a thin layer of the matrix rock appearing. A dark green rock is much in evidence in many cases. Twenty feet or more of this formation is cut through by the river at this spot. Half a mile beyond, the confounded white sandstone appears again; I thought that we had seen the last of it. Huge chunks are piled around in a confused mass in a small gorge, the rock itself also being seen *in situ*.

August 19.—A very short distance beyond this small gorge, the river flows through a deep gorge 40 to 100 feet deep. At the commencement of this gorge, and extending for a distance of 500 yards, the beds cut through are now the familiar white and reddish sandstones containing quartzite pebbles, mostly small; same rock on both sides of the river. On the north-east side beds are thin and horizontal; on the south-west side beds are thick and falsely bedded. Beyond this sandstone, which extends up 500 yards, the formation changes; Laurentian gneiss appears. The junction of the two formations is not very distinct, for a small landslide has taken place at this spot, but the difference in the colour of the soil is very apparent; the white sandy soil of the sandstone and the reddish purple of the new formation lie side by side; the gneiss extends up the gorge for a mile, and above it again crops out, extending also up small side gulches which adjoin the river. This rock has a very distinct foliation on the outside, more so than when broken. Breaks with a slatey cleavage. It is much broken up, up-ended, and generally jumbled about in the gorge, but dips east at a very high angle, almost vertical. Width of river at this point, 860 feet. Loose rocks of gneiss scattered around for 2 miles beyond the gorge.

August 20.—Travelled 12 miles up the river. Gneiss crops out all along in bed of river and at several other places, varying in character in different places.

August 21.—Proceeded up river to small lake. Rocks here, red granite (felspathic); very rocky country. Took a long walk in afternoon; rocks all the same—red granite *in situ*, and scattered boulders and fragments. Gneiss does not appear *in situ*, but boulders and fragments of it, irregular, angular, and sharp-edged; plentiful.

August 22.—Fourteen and a half miles up river. Land very flat and sandy, some high sand hills and knolls in view. At 5 miles, beds of red granite are cut by a thick vein of white quartz, in which nothing is visible. Vein running north and south (true) in form of a small ridge 70 yards by 15 yards. This was on south side of river. One and a half mile further up, outcrop of dark grey rock; very brittle, and splits up into small sections when tapped with the axe. Outcrop in bed of a small stream, coming in from the south; exposure about 40 yards in extent, dipping S. 30° E. at an angle of 60°. At 12 miles river cuts through a bed of Laurentian or granitoid gneiss, mostly grey in colour, but some reddish; horizontally bedded, smoothed, but not striated. Noticed several small outcrops of this rock yesterday and this morning, but the chief formation is the red granite. The curious balanced stones observed to-day for the first time.

August 25.—Travelled 6 miles. Barren land here terribly rocky—miles of loose rocks and boulders; red granite and granitoid gneiss. But I had little time to geologize, for I had to hunt up the blessed river, which we had lost in a lake.

August 28.—Camp at small lake leading into Kasba lake. Small outcrop of mica schist; a smooth low rock, full of small water-holes, sloping gently to water's edge; other rocks same as before, chiefly granite.

August 29.—South side of the divide (a short distance east of Clinto Colden lake). Quartzitic grey granite, dipping south-east at an angle of 75°; red granite, also in evidence a short distance east. Last sight of Laurentian gneiss, but it may be present. Had but little time to look around, as I was busy portaging.

August 31.—Fine-grained basalt (?) diorite (?) obtained from a highish rocky island, north-east end of Clinton Colden lake, rock sloping south-east to water's edge, smoothed and striated, striæ south-south-east; island 7 miles west from east end of lake.

September 1.—North-west end of Clinton Colden lake. Rocks, grey granite; a great deal of it; country very rocky.

September 2.—Went up strait between Aylmer and Clinton Colden lakes; coarse-grained biotite, quartzitic grey granite. Biotite occurs in small chunks, and the rock is very full of it in smaller pieces. Rocks much displaced, and a rough country. Some of the granite is red, in which felspar is very much in evidence.

September 3.—Along the south shore of Clinton Colden lake. Huge fragmentary rocks; where the rock is *in situ* it is smooth (waterworn) and slopes to the water's edge; no striation or grooves. The rock appears to have a certain foliation, and is associated with quartz in places; this rock, which I failed to classify, and the grey biotite granite are the distinctive rocks along the shore passed to-day. At two places the rock dips north at a high and low angle.

September 5.—Six miles south of narrows leading from Clinton Colden lake, similar rock to that on the King-ak portage (July 21)—pink felspathic granite. Rock sloping to water's edge; no definite dip and no striæ, but smoothed.

September 6.—River between Clinton Colden lake and Artillery lake, grey and felspathic granite occurs along the banks. In places the country is of a very sandy nature.

September 7.—Twenty-two miles south from head of Artillery lake, and on the west side. This rock (specimens have been lost, of course) occurs all along the west shore to our present camp, which is 36 miles from the head of the lake, the grey and felspathic granite only occasionally appearing. I called it an altered limestone (?) There are large outcrops of it all along; quartz being much in evidence in veins, pebbles, and small chunks. On the outside of the rock the quartz appears in queer-shaped excrescences, which run along in the form of ridges, giving the rock a banded appearance. The matrix is brown on the outside, grey inside; very hard. Amber-coloured quartz crystals in the form of sexagonal pyramids, also milk-white ditto, were very common, and some beautiful specimens were taken. The rock itself reminded me of the boulders found on the Ark-e-leenik river (August 12). These boulders appeared to be composed of a hardened shale, and were a dullish white on the outside, and this rock has a brown appearance on the outside, but to the eye they appeared to be of the same composition. At the foot of the Artillery lake, at the outlet, there is a vein of discoloured quartz containing large quantities of iron. I have a specimen of this; the rocks were granitic again, and this was the last place where any notice was taken of the rocks, for our trouble then commenced.

Slave lake has by this time been fully reported on. Sandstone occurs on some of the islands near Fond-du-lac.

In the foregoing notes, on the days which are missed, it must be supposed that the formation of the previous day or days continued, or else that no rocks were met with. There were no fossils to be found in the sandstone, although I searched diligently for them at several places.

Date	Bar. 6 a.m.	Bar. 6 p.m.	Ther. Min.	Ther. Max. in shade.	Remarks.
				°	
May					
12	—	30·08	11	—	Left Churchill.
13	30·10	30·21	13	—	Cold and cloudy, wind N.W.
14	30·28	30·30	1	—	
15	30·22	30·13	6	—	Wind N.
16	30·04	30·10	16	—	Warm day, wind W.
17	30·12	30·13	9	—	Wind S.E.
18	30·13	30·00	5	—	Wind S.
19	30·03	30·08	10	—	20 miles south of Eskimo point.
20	30·13	30·11	15	—	Cool and cloudy, wind S.
21	30·11	29·88	18	—	Inland from Eskimo point.
22	29·48	29·89	27	—	Eskimo point 9. A blizzard.
23	30·00	29·96	4	—	,, gentle breeze N.W.
24	29·81	29·73	18	—	,, wind N.E., thick and snowing.
25	29·78	29·86	18	—	,, wind N.W., blowing and drifting. ,,
26	29·98	29·95	12	—	
27	29·94	29·95	12	—	Left Eskimo point. Wind S.E., mild and cloudy.
28	29·87	29·90	26	—	Wind S.E., dull and cloudy.
29	29·86	29·87	2c	—	Wind N. and N.E., cool and cloudy.
30	29·88	29·95	25	—	Wind N.W., dull and cloudy.
31	30·00	29·96	22	56	Wind N.W., thawing in afternoon.
June					
1	30·04	30·08	22	65	Wind W., warm and sunny.
2	30·04	30·00	18	—	Wind N.W., bitterly cold. Term point.
3	29·92	29·90	20	—	Wind S.E., fine. Left Term point.
4	29·89	29·92	24	—	Misty in morning, clear in afternoon.
5	29·98	30·17	15	—	Wind S.E.E., warm and hazy on Marble island
6	30·20	30·04	28	63	Wind S., fine and calm, snow fast melting.
7	29·96	29·80	28	—	Wind S.W. Left Marble lake, arrived Baker's foreland.
8	29·72	29·70	33	—	Wind N.W., gentle breeze; 16 miles south of inlet.
9	29·67	29·65	33	—	Wind W., hot and bright. Wag island.
10	29·68	29·74	34	—	No wind, perfect day. Variety point.
11	29·68	29·63	24	73 (in sun)	Gentle S. breeze.
12	29·56	29·67	33	—	Wind S.W., dull and cloudy. Left Variety point.
13	29·80	29·85	22	—	Near Dangerous point.
14	29·78	29·64	28	—	Wind S.W., strong, fine day, south-west of Dangerous point.
15	29·50	29·53	24	58	Rain, heavy shower in afternoon.
16	29·64	29·64	32	50	Wind W., dull; clear in evening.
17	29·64	29·72	30	56	
18	29·73	29·69	24	—	Skiff of snow in morning, near North river, Cape inlet.
19	29·60	29·60	31	—	Wind W.; fine near Stony point.
20	29·64	29·73	33	—	Wind S.W., fine, gentle breeze.
21	29·76	29·70	32	63	Wind N.W., fine. Near mouth of Quoich river.
22	29·72	29·75	32	—	Variable light airs, fine. Bowell island
23	29·82	30·04	38	—	Wind N.W.; rain last night.
24	30·07	30·04	37	64	No wind, fine. Baker lake.
25	30·02	30·09	34	63	Wind S.E., strong. Baker lake.
26	30·13	30·12	35	—	Wind S.E., gentle. ,,
27	30·18	30·13	29	—	
28	30·04	29·97	31	66	Wind S., strong; weather fine.
29	29·98	29·67	30	—	Wind S., moderate.
30	29·51	29·43	36	63	
July					
1	29·57	29·58	28	—	Wind N.W., strong, cloudy; still at east end of Baker lake.
2	29·60	29·62	36	59	
3	29·64	29·54	36	58	Wind N.W., strong.
4	29·63	29·73	36	53	Wind N.W., dull and cloudy.
5	29·88	29·90	37	65	
6	29·96	29·78	38	72	Wind S.E., hot; sunny in morning, overcast in evening.
7	29·67	29·70	42	62	Wind N.W.; rain last night.
8	29·67	29·51	33	—	Wind S.E., strong. Left east end Baker lake.
9	29·68	29·70	32	53	Wind N.W.; heavy rain last night.
10	29·61	29·69	33	—	Travelling west towards Kazan river.
11	29·79	29·75	37	80	Wind S.S.W.

Date	Bar. 6 a.m.	Bar. 6 p.m.	Ther. Min.	Ther. Max. in shade.	Remarks.
				°	
July					
12	29·70	29·68	—	—	Wind S., fine.
13	29·70	29·68	40	75	Wind S.S.W. Mouth of Kazan river.
14	29·75	29·87	42	—	Wind N.N.W., rain in morning. Mouth of Kazan river.
15	30·03	29·92	39	58	Wind N.N.W.
16	29·88	29·85	42	72	Still at mouth of Kazan river.
17	30·00	30·04	34	64	Wind N.W., fine.
18	30·00	29·90	35	73	No wind, very hot.
19	29·78	29·63	42	—	Wind E. Started west from Kazan river.
20	29·58	29·62	42	—	Wind N.E., thick mist. West end Baker lake.
21	29·72	29·76	—	64	Fine. West end of Baker lake.
22	29·80	29·60	37	—	Wind W.
23	29·61	29·60	41	—	
24	29·70	29·41	38	—	Rain in evening.
25	29·37	29·43	46	—	Wind N.W.; rain last night.
26	29·47	29·30	30	—	East end of Schultz lake.
27	29·13	29·25	43	52	Heavy rain-storm in morning from S.E.
28	29·30	29·13	33	58	Wind W., light.
29	29·18	29·12	34	51	Rain.
30	29·15	29·16	35	59	Wind N.W. West end of Schultz lake.
31	29·18	29·18	32	—	Wind W.N.W. East end of Aberdeen lake.
Aug.					
1	29·20	29·30	29	54	Strong N.W and W.N.W. winds the last few days.
2	29·45	29·36	38	56	Strong W.N.W. On Aberdeen lake.
3	29·30	29·33	43	—	Strong N.W.E. West end Aberdeen lake
4	29·46	29·64	39	58	Commenced ascent of Arkeleenik river (Thelew dereth of Back)
5	29·70	29·72	27	—	
6	29·73	29·65	44	—	Wind N.E., light; very fine.
7	29·60	29·48	40	—	Wind N.E., light. Ascending Arkeleenik.
8	29·50	29·43	39	—	Travelling west towards Great Slave lake
9	29·44	29·43	47	63	Wind N.E.
10	29·47	29·45	45	—	Wind N.E., showery.
11	29·43	29·36	41	53	Fine.
12	29·30	29·23	37	—	Fine.
13	29·20	29·16	37	—	Fine.
14	29·21	29·20	37	—	Fine.
15	29·23	28·98	36	—	Fine.
16	28·93	28·87	45	—	Altitude 777 feet.
17	28·88	28·80	49	—	Travelling west and ascending.
18	28·78	28·70	—	—	
19	28·82	29·08	40	—	High wind, heavy rain.
20	29·20	28·81	30	—	
21	28·66	28·76	32	—	Rain in morning.
22	28·80	28·57	28	—	
23	28·46	28·28	28	—	
24	28·30	28·17	24	—	Altitude 1354 feet. The divide.
25	28·27	28·29	31	—	Skiff of snow.
26	28·34	28·30	32	—	
27	28·25	28·23	34	—	Wind N.W.
28	28·20	28·12	29	—	
29	28·29	28·36	31	—	N.E. wind.
30	28·37	28·37	34	—	Dull and showery in morning. East end Clinton Colden lake.
31	28·48	28·43	33	43	W.N.W. wind. Still on Clinton Colden lake.
Sept.					
1	28·55	28·62	28	—	
2	28·68	28·62	32	—	Travelling west on Clinton Colden lake.
3	28·56	28·38	35	47	Strait between Clinton Colden and Aylmer lakes.
4	28·37	28·30	30	—	Returning south and east on Clinton Colden lake.
5	28·60	28·04	28	54	
6	28·16	28·32	31	—	Wind N.W. East end of Clinton Colden lake.
7	28·36	28·42	29	—	Between Clinton Colden and Artillery lakes.
8	28·32	28·20	33	—	Altitude 1252 feet. On Artillery lake.
9	28·06	28·27	36	42	N.E. Moderate gale.
10	28·13	27·97	34	43	S.S.E. heavy wind.
11	Accident happened.				
12 13	Thought we saw smoke. Went to look. Tried to swim; built raft and got canoe. Proceeded down river, which we shortly afterwards had to leave.				

A JOURNEY FROM LAKE NAIVASHA TO THE VICTORIA NYANZA.*

By Captain G. H. GORGES, of the Uganda Rifles.

Leaving Naivasha station on the morning of November 26, 1899, with a caravan numbering in all eighty-eight, two marches brought us to the west of Lake Naivasha. We skirted the southern shore, over grass downs and through occasional clumps of mimosa, passing many small volcanic peaks and ridges, whose slopes are covered with volcanic dust, obsidian, and lava rock. On the third day we ascended the wooded heights which form the first step of the Mau escarpment, continuing our way across an open grass valley and up the escarpment to the borders of the forest—a climb of nearly 3000 feet from the lake. This country on the eastern slopes of the escarpment, between the lake and the forest, is at certain periods of the year, usually in the rainy season, inhabited by the Masai, the grass in the valleys and on the hillsides affording good grazing for their cattle, sheep, and goats.

On the fourth day (November 29) we entered the forest, and I confess to having felt a little anxious for the comfort of the caravan, as previous accounts of attempted journeys through this somewhat difficult country were not very encouraging. However, after three days' hard work, we successfully accomplished this part of the journey. Scarcity of water through the forest was the only real discomfort we experienced, and had we not had the good fortune to meet a small party of Wandorobo in pursuit of game, who for a small present led the caravan to a water-hole, I believe we should have been forced to retrace our footsteps and endeavour to find another route, for after leaving the water-hole on the following morning, water was not again found until we had marched for eleven hours. The forest here is not more than 30 miles broad from east to west. Further to the north it widens considerably, and in some parts is not less than 70 to 80 miles across. The only inhabitants of this forest region are a few Wandorobo, who dwell in small grass huts, which they hurriedly construct where they can conveniently get water, and sometimes near to where a herd of elephant happens to be feeding. They live entirely by the chase, are very timid, and most of them, on the approach of the caravan, fled into the undergrowth. There are many gigantic trees in the forest, the largest being juniper and cedar; we saw several specimens of beautiful tree orchids, ferns, including maidenhair, and bracken, and various kinds of wild flowers and creepers.

On December 1 the caravan emerged from the forest into a large tract of open country—undulating grass spurs, intersected by deep

* Forwarded by the Foreign Office. Map, p. 140.

wooded ravines and valleys. On leaving the forest, I observed that the country to the west was thickly wooded. To the north was dense forest, and to the south and south-west for many miles rolling downs, in parts thinly wooded. I therefore decided, for the present, to take a south-westerly route, thereby avoiding to a great extent the more difficult wooded country. The result was satisfactory, for we continued our journey across nearly 70 miles of country without meeting with any serious obstacle to hinder our march. This large tract of open country, bounded on the east and north by the forest, on the west by thickly wooded heights, on the south by the Dogolani desert, and on the south-west by two ranges of mountains, named respectively Subugu Loitoi and Subugu Erok (*vide* map), is well watered by the Gwaso Nyiro and its tributaries, the chief of which are the Gwaso Na Erok, Gwaso Samvei, and Gwaso Nuso. The Nyiro drains the southern flanks or slopes of the great Mau escarpment, and the general direction of its course after receiving its tributaries is due south. It flows through the Dogolani desert, and finally empties itself into a salt lake, some miles to the south in German territory.

This open country above described was once inhabited by the Masai, of whose kraals we found many traces near the rivers. It is a magnificent grazing country, but I am told by some of the older Masai of Naivasha that, owing to the incessant raiding and lifting of their cattle by the Masai from German territory on the south and the Sotik on the west, the survivors fled with their cattle and took refuge near the shores of lakes Naivasha and Elmenteita some ten years ago, placing between them and their enemies the Mau escarpment and the forest. The soil consists chiefly of a kind of red sandstone, varying in hardness, and in places greatly worn by the action of water. The river banks and beds are rocky, whereas the soil of the ridges and plains is quite sandy. Near the rivers are large patches of "scrub" jungle, very difficult to penetrate, and in which one is very apt to lose one's bearings.

On December 7, taking a north-westerly direction, we again entered a forest, or rather crossed a succession of thickly wooded heights, which form a barrier from 10 to 15 miles broad between the basin of the Nyiro on the east and the cultivated region, comprising the countries of Sotik and southern Lumbwa on the west. On December 9 we entered the country of Sotik. The inhabitants were at first suspicious, but happily we continued our journey to the shores of Victoria Nyanza unmolested, and without the slightest trouble with the natives, encamping on December 14 on the banks of the river Kimsonoi, which forms the boundary between Sotik and Lumbwa, and on December 17, 18, and 19 we travelled through south and south-west Lumbwa.

On leaving the Lumbwa country we again found ourselves in an uninhabited region—a large tableland, about 20 miles across, covered with high grass and thinly wooded, dividing Lumbwa from the district of the

Kach, a small tribe inhabiting the shores of Lake Victoria on the south-east of Ugowe gulf. Here we encamped on December 20, after a journey of approximately 220 miles from Naivasha station.

I travelled by almost identically the same route on the return journey for the following reasons :—

1. It was desirable to establish thoroughly friendly relations with the inhabitants of Lumbwa and Sotik.

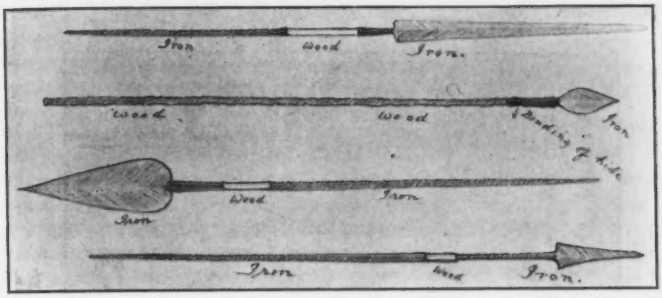
2. The Kosova, a somewhat powerful and war-like tribe inhabiting the peninsula between Ugowe gulf and Kavirondo bay, south of the Sondo river, through whose country it would be necessary to travel in order to explore the shores of the lake near the German boundary, were unfriendly, and as I was anxious to avoid conflict with them, I deemed it advisable not to attempt to force my way through their country, lest my escort should not prove strong enough to resist their attacks. I therefore very reluctantly had to abandon any attempt to discover what the Germans are doing on the lake.

3. Food for the caravan had to be procured for the return journey, and as the Lumbwa appeared to have plenty of grain stored in their villages, I decided to endeavour to establish a market in their country for the purchase of supplies for the caravan to Naivasha.

The return journey from the lake-shore to Naivasha was accomplished in eighteen days, *i.e.* in seven less than the outward journey. This was due to the fact that on the outward journey we had to find our water, and proceed with caution and slowly through the inhabited districts, whereas on the return journey we knew our road, how to deal with the natives, and where to find water. The following notes respecting the districts visited may be of interest.

Sotik.—This country lies about 100 miles from and almost due west of Naivasha station, and is bounded on the east and south by thickly wooded heights and dense forest, on the north and north-west by Lumbwa, and on the south-west by Kosova. Sotik is a small district, thinly populated, inhabited by a peaceful and independent tribe, whose attitude was on the whole most friendly. In bearing the men are not unlike the Masai, but are not to be compared with them in physique or good looks. They are well proportioned, muscular, and of medium height. Many of the older men are very treacherous looking; some even have a villainous cast of countenance. I should say they are like the Wa Kikayu in this respect—treacherous, though I confess I saw no attempt at any act of treachery on their part towards me or my men, but imagine that they refrained from any attempt at ambuscades, or from molesting the caravan in any way, simply because they saw we were too strong, and that every precaution, both day and night, was taken to guard against surprises. They are armed with spears of all shapes and sizes, and many of the older men carry bows and arrows of indifferent make. They all carry a most formidable weapon, in the

shape of a long-bladed, double-edged knife, sharp as a razor, with a small leather handle, in a well-made wooden sheath bound with hide, which is worn on the right side and secured to the waist by a narrow belt made of gut and beautifully worked with different-coloured beads. Most of these knives are from 30 to 40 inches in length. They likewise



SOTIK SPEARS.

carry shields of cowhide, similar to the Masai shield, but not so well made.

The younger men and boys wear a small piece of cloth over the shoulders saturated with fat and dirt, the elders being more comfortably clad in goatskins. Some of the head-dresses are most picturesque;

SOTIK KNIVES.

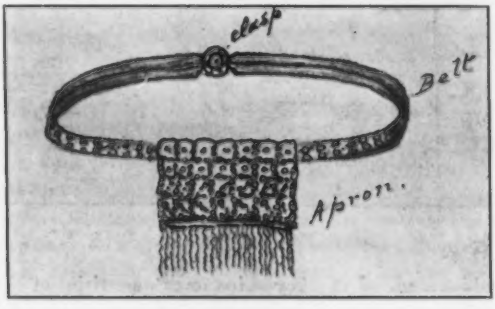
enormous busbies made of monkey-skins or of quantities of black fowls' feathers fixed into a leather cap which fits tightly to the head, giving to the wearer a very warrior-like appearance. The method of circumcision adopted is a simpler one than that of the Masai. It mainly consists in removing the foreskin with a piece of red-hot iron, the effects of cauterization being ample to check any severe bleeding.

The women are of small stature, well proportioned and graceful, but, on the whole, not good looking. Most of the young girls are naked; a few wear a small apron made of leather, prettily ornamented with white beads, extending from the umbilicus to just above the knees, and

fastened round the waist by a beautifully worked narrow belt made of leather, cowries, and beads. The older women wear large skins of cow-hide from the shoulders to the ankles. All are extremely partial to ornaments, and especially fond of cowries, Elkuta, white beads, iron chain, and brass wire. They are most respectfully and well treated by their men. The operation upon women differs in no way from that practised by the Masai.

SOTIK HEAD-DRESSES.

The physical appearance of the ears (both of men and women) is most extraordinary, the whole of the pinna of the ear being perforated and disfigured by ornaments of all sizes, of wood, iron chain, brass, ivory, and copper and iron wire. The strange habit of extracting the lower



SOTIK GIRL'S APRON.

central incisors, so common among the local tribes of this country, also prevails among them, the explanation being, that when any of them become temporarily unconscious or seized with convulsive fits, they can be fed through this aperture.

The country is very hilly, well watered by three fair-sized rivers (each with tributaries), named respectively the Amala, Nyongores, and Kimsonoi, the last named, as already stated, forming the boundary

between Sotik and Lumbwa. It flows in a south-westerly direction into the Sondo river, which enters into the Victoria Nyanza to the south of Ugowe gulf. The Amala and Nyongores take a southerly course through the forest to the south of Sotik, but where they eventually discharge their waters I cannot at present state, but believe they join with other streams, and finally bend to the west to Lake Victoria in German territory.

The hillsides are dotted with patches of cultivation, and the valleys are mostly thickly wooded. The soil of the country is of a rich black loam and red marl, and is highly fertile. Every kind of vegetable, native and English, could, I feel certain, be successfully cultivated; the natives, however, grow only wimbi,* not to any extent, but just enough to satisfy their own wants. Mtama† is grown in very small quantity, also a few beans and pumpkins, and some tobacco. Bees are largely cultivated, and the honey is of excellent quality. Chickens and eggs are procurable.

There is a great deal of good pasture land in this country, where small herds of sheep and goats and a few cattle graze. There are also many thousand acres of uncultivated waste land, overgrown in parts with thick impenetrable scrub, at an altitude of from 5600 to 6000 feet. The climate is extremely healthy and mild at this time of the year, but I believe that in the rainy season, which commences about February and ends in May, living here would be somewhat uncomfortable for Europeans.

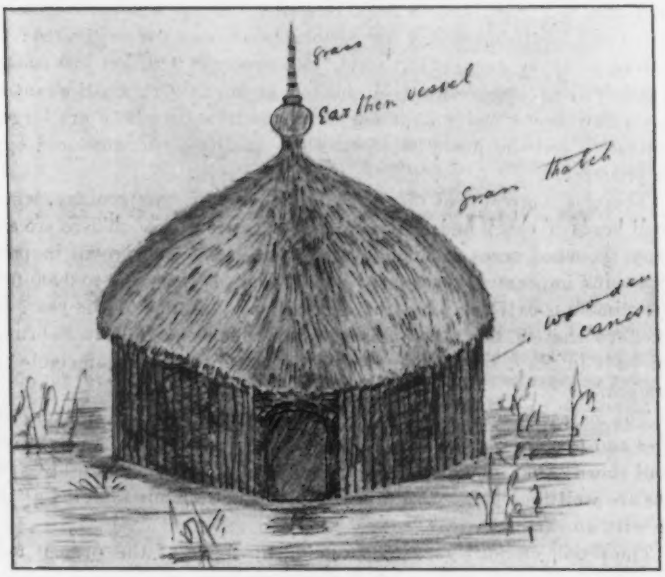
The natives dwell in small beehive-shaped huts lying in groups of three and four on the sheltered hillsides, surrounded in most cases by a small thorn *boma*, in which they also herd their cattle at night. The huts are well thatched with grass and reeds, and are ornamented at the top with an earthen vessel.

The people of Sotik recognize a chief, the name of the present man being Loloisuru; but from what I saw during my visit to the country, I don't think he exercises much authority over his subjects. There are also a number of petty chiefs, or rather headmen of groups of villages. I had many interviews with the chief and most of the headmen, and explained to them that I had been sent by Her Majesty's special commissioner for the express purpose of establishing friendly relations with them and the people. They told me that few white men had ever visited their country; that some years ago a large caravan led by three Europeans had passed rapidly through further to the north into Kavirondo. These were evidently Pringle, Austin, and Sergeant Thomas of the Macdonald Survey Expedition. They said that, not knowing why so large an armed force was moving amongst them, their Elmoran were

* A kind of *pennisetum* grain.
† *Holcus sorghum.*

continually on the alert. Since then no white man has visited the country, but a few Swahili caravans trading in ivory have passed through from German territory to Kavirondo at long intervals.

I made presents to the chief and all the headmen, and in return received a few sheep and goats, which were badly wanted for the caravan. I think I made them understand their position, viz. that the country, though their own, is under the protection of the British Government, and that every white man and trader must be granted a



SOTIK HUT.

free passage through the country without being molested, whether armed or not.

LUMBWA lies to the north and north-west of Sotik, and resembles it in many respects. The country is not so hilly, and is very bare of trees. It is far more extensively cultivated and more thickly populated.

The Lumbwa are a finer race than the Sotik, both men and women being of better physique and better looking in every respect. They proved to be very friendly, though on first entering their country after crossing the Kimsonoi river, they assembled in large numbers and held a "shauri" to discuss whether or not they should demand from me a present before permitting me to proceed with my caravan. I observed an unusually large gathering of Elmoran, and took every precaution to

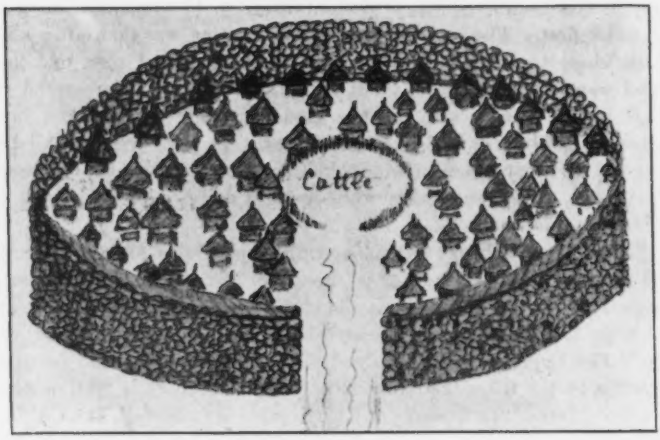
guard against a rupture. I then, on learning the nature of their discussion, sent for the chiefs and informed them that they could at once go and tell the people that they must banish from their minds any idea of demanding anything from a Government officer; that, on the contrary, it was their business, if presents were to be exchanged, to make one to me first. The result of this communication was that, after a few hours, sheep and goats were brought to the *boma*. I then told them that I wanted nothing from them, bought the sheep, and presented the chiefs and headmen with various kinds of trade goods. The large gathering of Elmoran broke up, and friendly relations were established. Supplies of every description, including flour, beans, honey, tobacco, fowls, eggs, sheep, and goats were brought daily to the *boma*, and we were never once molested.

The same customs prevail amongst these people as among the Sotik. The dress of men and women is the same. The men carry the same weapons of offence and defence; but the spears are better made, and the large leaf-bladed spear is carried by most of the young fighting men. The Lumbwa are undoubtedly a more prosperous and in every respect a better tribe than the Sotik. Their country is well watered by three rivers, the Kimsonoi, Kintoi, and Tuyawe all flowing in a south-westerly direction into the Sondo, which last drains both Lumbwa and Kosova, and flows into the lake opposite two small islands on the south of Ugowe gulf. The soil of the country differs in no way from that of Sotik, being rich and fertile. A great quantity of wimbi is grown, but there are also in this country large tracts of uncultivated land. The altitude varies from 4500 to 5000 feet. The climate is healthy, very hot during the day, and excessively cold at night. I should imagine, however, that in the rainy season this country would not be so healthy, there being so many swamps in the valleys which intersect the bare hills.

The name of the chief of the part of Lumbwa through which I travelled is Singari. He appears to be a reliable man, and has great influence over his people and headmen, the discipline amongst the fighting men being very marked. The people were most respectful, and friendly with my Swahilis—so much so, that when the caravan was marching through the country, the women insisted on several occasions on carrying the porters' loads, a practice which had to be stopped, owing to the very slow progress made.

Kach.—This is a small tribe inhabiting the low-lying country on the south-east shores of Ugowe gulf. They possess herds of cattle and flocks of sheep and goats, but do not cultivate the soil. They dwell in large fortified villages, surrounded by walls built of stone and mud, the reason for this being that they are continually raided by the Kosova from the south and the people of South Kavirondo from the north. Each village consists of from fifty to sixty beehive-shaped huts, packed closely

together within the circular wall, while the live stock is herded in a paddock in the centre at night. The following rough sketch will give some idea of one of these villages:—



A KACH VILLAGE.

Of splendid physique, the Kach are savage, and carry spears, bows, and arrows; but they are too small a tribe to do any harm, and it was for this reason, and owing to the fact that they knew that unfriendly relations would probably mean the confiscation of their cattle, that they were friendly with us. Both men and women are naked.

The Lumbwa called these people Kach, but they called themselves Kachwachi; but I am inclined to think that Kach is the name of the tribe, and that Wachi must mean people or tribe, though I could not say for certain, being ignorant of their language. The climate of this country is exceedingly hot and unhealthy, as it is low-lying and swampy, and a large belt of papyrus runs out from the shore into the lake for more than a mile.

Kosova.—I saw very little of this tribe. The Lumbwa, Sotik, and Kach are frightened of them, being constantly raided by large parties of Kosova warriors, who carry off their cattle and women. In fact, the Sotik appear to me to be utterly cowed by this more powerful tribe. I was earnestly requested by all the friendly natives to go and recapture for them some of their stolen cattle, which they prize far more than their women. I however refrained from any such business, and assured them that the present state of affairs would be duly reported to Her Majesty's Special Commissioner, with a view to some steps being taken to ensure their living at peace with and in good-will towards their

neighbours in the future. My intention was to traverse Kosova to the lake, and if possible visit the German post on the boundary; but I could see from the beginning that these people determined not to permit me to travel through their country in peace, and, not wishing to act in any way contrary to my instructions, I, as before stated, unwillingly left them alone. I feel convinced, however, that with a stronger escort, say in all fifty rifles, I could establish thoroughly friendly relations with this tribe without in any way resorting to armed conflict. I trust that on some future occasion I may be able to visit these people. They are undoubtedly brave and warlike, and largely cultivate the soil.

Game.—Almost every description of game was seen on the journey. The country drained by the Gwaso Nyiro is a splendid feeding-ground, and consequently the home of game. Elephant, rhinoceros, giraffe, buffalo, zebra, eland, wildebeest, mpalla, Coke's hartebeest, *Grantii*, and *Thomsonii*, various bush-buck, wart-hog, and ostrich feed here unmolested, except during the occasional hunting expeditions of the Wandorobo in these parts. The belt of uninhabited country between Lumbwa and Kach also contains many varieties. We shot elephant, Jackson's hartebeest, the Topi hartebeest, water-buck, reed-buck, and wart-hog. The rivers of Lumbwa are full of hippo, and at the request of the natives we shot two or three, which brought the whole country-side to the scene. They made short work of the meat, eating it raw, and covering themselves with the fat. It took them less than an hour to cut up and devour three enormous hippo. Four elephants were bagged under somewhat peculiar circumstances. On December 22, during the return journey, the caravan was marching peacefully along the high ground between Kach and Lumbwa, when suddenly a large herd of elephant appeared on our right flank. This was the signal for a general stampede of the porters; loads were dropped, and the men rushed into the bush in all directions, some of the elephants actually running over the loads. The herd had evidently been frightened by a large grass fire in the valley of the Sondo, and were tracking across country when they suddenly came on the caravan. In self-defence I and Sergeant Myles shot at them and bagged four, the tusks of which have been handed in to the Government store at Naivasha as revenue, with the exception of one pair, which Sergeant Myles has been permitted to keep as a trophy, pending the wishes of Her Majesty's Special Commissioner and Commander-in-chief in the matter.

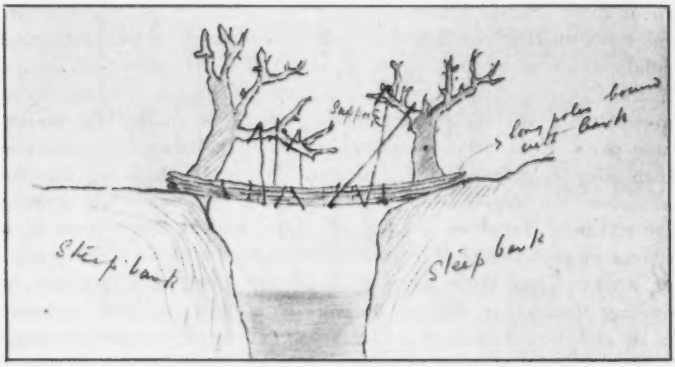
Fish.—Several were caught in the Nyiro and in its tributary the Na Erok. One kind was particularly good eating, somewhat like the perch, but smaller, seven or eight going to the pound. Another was a mud-fish, and by no means good eating. The Nyiro and Na Erok were the only two rivers containing fish.

Birds.—I regret I am unable to describe the many varieties of

beautiful birds I saw. A splendid collection could be easily made in this country.

RIVERS.—Most of the rivers in the wet season would be most difficult to cross, and some impassable. We were very fortunate in travelling through the country at an unusually dry season; had it been otherwise, the journey could not possibly have been accomplished under two and a half to three months.

The river Sondo, after receiving its tributary, has, for a distance of 50 miles before its mouth, an average width of 60 to 70 yards. It flows over huge boulders, and has a very rocky bed. Though fordable at present in places, it could not possibly be crossed at any point in the



NATIVE BRIDGE

wet season. The smaller rivers could be bridged, the average width of the Nyiro, Amala, Nyongores, Kintoi, and Kimsonoi being not more than 30 to 40 feet, and in places their banks are steep, and therefore adapted to rough bridging. The natives have constructed a few suspension bridges of peculiar fashion by utilizing the strong branches of trees which overhang the river-bed. The long thin poles which span the river are bound together with bark, and strong crooked poles support the bridge in the centre. The accompanying sketch gives a rough idea of how these bridges are made.

GEOLOGY.—The rocks are chiefly volcanic—obsidian, lava, etc., with some sandstone. On some of the hills in Sotik and Lumbwa there is a kind of white marble rock. As regards gold-bearing rock, in the hills near the lake-shore, between Lumbwa and Kach, I found what I thought might contain gold, and after washing it carefully, what looks to me very much like gold-dust is seen at the bottom of the pan. I have forwarded a specimen to the Ravine for inspection.

SUPPLIES.—Plentiful, especially flour. A caravan of a hundred men

could be well supplied all the year round by the Lumbwa and Sotik without causing any drain on the country, and of course, if a Government station was built, food in abundance would be procurable, as the natives would cultivate larger areas. Indeed, with little labour, a *boma* could be made self-supporting. I have in my mind's eye a few excellent sites for a Government station, on high ground, in close proximity to clear running hill streams, where the ground in the vicinity could be easily cultivated, and would yield English vegetables of every description, and where there is abundance of firewood and stone for building purposes.

Health of Caravan.—Not a single man was incapacitated from work throughout the journey; a few cases of mild fever and coughs occurred during the crossing and recrossing of the escarpment, and the passage through the forest, owing to the severe cold, accompanied by incessant and heavy rain.

Conduct.—The behaviour of the men, both escort and porters, was excellent, and it was chiefly owing to this that we made such good friends with the natives.

Results of Journey.—1. Thoroughly friendly relations were established with the Sotik, Lumbwa, and Kach.

2. A fairly easy route was found from Naivasha to the food-producing countries. With a small amount of labour, the road could be considerably improved, and the journey from Naivasha to Sotik performed in nine days (including one day's halt).

3. Although the Kosova were unfriendly, the result of coming into contact with them is not unsatisfactory, for on a future visit I feel confident I could go through their country by forming a *depôt* in Lumbwa, and by taking a slightly stronger escort.

4. It is satisfactory to know what a really well-watered country this is, both in the inhabited and uninhabited parts, and that there are supplies all the year round. Of course this route loses any importance it might have had, owing to the advance of the Uganda railway, but were it not for the fact that a railway is in course of construction to the north of Ugowe gulf, this new route would be shorter than the present one to Port Ugowe—*for porters.*

In conclusion, I would like to say a few words in praise of my British non-commissioned officer, Sergeant J. Myles, who ably assisted me in every detail connected with the discipline and comfort of the caravan. Throughout he proved himself to be a hard-working, zealous, and capable non-commissioned officer, thoroughly trustworthy and reliable when thrown on his own resources.

ADMIRALTY SURVEYS DURING THE YEAR 1899.

UNDER the orders of the Lords Commissioners of the Admiralty, eight of Her Majesty's vessels, with three small hired steam-vessels, manned by 78 officers and 639 men, have been employed on hydrographical surveys on the home and foreign stations. A naval officer, assisted by officers of the Royal Indian Marine, has also been employed, with the sanction of the Admiralty, under the Indian Government.

The following is a brief summary of the work accomplished, as detailed in the report prepared for presentation to Parliament:—

The number of newly discovered rocks still increases; reports of 274 rocks and shoals, which were dangerous to navigation, have been received at the Hydrographic Department, and were notified to the public by Notices to Mariners; 1223 miles of coast have been charted, and an area of 4654 miles has been sounded.

On the east coast of Scotland:—The survey of Cromarty and Inverness firths was completed.

On the west coast, close surveys were made of Loch Broom, Portree harbour, Loch Ewe, and Loch Ryan.

On the east coast of England:—Observations were made to ascertain the set of the tidal streams at several positions on the east coast, and the following surveys were carried out:—

The portion of the Humber between Barrow haven to the westward and Skitter Ness and Saltend to the eastward.

This survey reveals the fact that considerable decrease in the depths, notably in the neighbourhood of Hull Middle Sand, has taken place since the year 1894; as this shoaling is unaccompanied by any general deepening of the channel, it may have a somewhat serious aspect in connection with the future navigability of the Humber about Hull.

The Shingles patch in the Duke of Edinburgh channel was resounded. It was found that the shoaling of this obstruction still continues.

Other work was done at Harwich, Goole, and in the Orwell.

On the west coast of England:—Morecambe bay was resurveyed. A survey of the approach to Barrow-in-Furness was begun, and a portion of the entrance to Peil harbour was sounded.

The examination of the shoals off the Scilly islands, 108 in all, was also completed.

St. Heliers, Jersey, was examined, and a plan was made of St. Peter's port, Guernsey.

On the south coast of England:—The recently dredged areas at Plymouth on the Vanguard and Rubble banks were examined, and the Vanguard was reported clear for navigation.

A survey of Dartmouth harbour was begun, and a portion of the soundings in the outer approaches was obtained.

On foreign and colonial shores:—In Newfoundland the survey of White bay was continued, and plans were made of Bedeque harbour, the anchorage at North Sydney, Seal arm, Little harbour deep, Fourché and Hooping harbours.

On the west coast of Africa:—The survey of the river at Sierra Leone, begun last year, was finished, and a large plan was made of the anchorage at Freetown. Forcados bar was surveyed; it is one of the many entrances to the Niger, and has been the deepest for some years, but has not been charted since it attained its present depth.

A survey of the Congo river was made from Boma to Bull island, a distance of 36 miles; astronomical positions were obtained as far as Matadi, the furthest navigable point; and a plan was also made of Banana creek at its entrance.

A series of observations was made to ascertain the movements of the under-currents near the mouth of the river; the results have been published by the Admiralty.

On the west coast of North America:—The survey of Nanaimo, begun last year, was completed.

The first narrows of Burrard inlet were resounded, and a survey of Discovery passage was begun.

Deep-sea soundings and serial temperatures were obtained from Vancouver towards Australia for a distance of 2880 miles, thus completing a survey of the proposed route of the Pacific cable. This cruise occupied four months.

Magnetic observations were obtained at Honolulu.

In the Red Sea:—For the purpose of reporting, at the request of the Turkish Government, on the best system of placing aids to navigation, a plan was made of Kamaran bay, which is the quarantine station for Suez, and much frequented at certain times.

A prolonged but unsuccessful search was again made for the "Akbar" rock, a danger reported in the fairway of the Massawa channel. This search occupied three months of the *Stork's* time, the importance of verification or disproval being considerable.

In the Mediterranean sea:—At Nauplia the head of gulf was resurveyed.

In China:—The survey of Tinghai and its approaches was completed.

The main portion of Samsa inlet was surveyed, including the anchorage of Santu.

Observations were obtained of the currents and tidal streams at West Volcano island, Gutzlaff island, and in Vernon pass. It is hoped that these observations may tend to prevent the accidents which from time to time occur from want of knowledge of the tidal streams in this portion of the inshore route to the Yangtse Kiang, which is much used by small steamers in the north-east monsoon.

In Australia, on the west coast:—A good chart was made of Mary Anne passage and its approaches, and a plan of Onslow roads; both surveys disclosed many new shoals dangerous to navigation. Mary Anne passage was found to be narrower than formerly reported.

Strathmore rock was looked for without success; the examination showing the extreme improbability of its existence, it has been removed from the charts.

A series of soundings was obtained off shore from Cape Naturaliste to King George's sound, a distance of 270 miles. The 100-fathom line is defined throughout, and it was found that in the approach to Cape Leeuwin the contour of the bottom will afford great aid to navigation; to the eastward of King George's sound this is not the case.

A line of deep-sea soundings and serial temperatures was obtained from King George's sound to Tasmania.

In Queensland:—The survey was resumed inside the barrier reefs northwards of Cooktown and completed from Aye reef to 2 miles east of Dhu reef; the coast-line and off-shore soundings were obtained between Claremont point and a position 2 miles south of Cliff island, and a detailed survey made of Flinders group and its vicinity.

A plan was also made of Cairns harbour, which place is increasing in importance.

Magnetic observations were obtained at Cairns and Townsville.

A dangerous 24-foot rock was found directly on the "course recommended"

half a mile north of Cape Flinders; also five other shoals lying near enough to the usual track to make their discovery of considerable importance.

In Tasmania:—A triangulation of Port Davey and Bathurst harbour on the west coast was completed.

In India:—The survey of the North Andaman island from Temple sound to Flat point was completed.

The astronomical position of the Andaman islands was verified by meridian distances. The western entrance to Andaman middle strait was surveyed.

Flat rock and Invisible bank were carefully examined, but no fresh dangers to navigation were discovered.

The survey of the west coast of Hindustan from Honovar to Mangalore was in progress at the end of the year.

During 1899 the Hydrographic Department has published 86 charts and plans, also 36 current charts; 33 plates have been improved by the addition of 41 new plans; 239 plates have been largely improved by additions and corrections; 4795 corrections have been made to plates by the engraver; 31,440 charts have received minor corrections at the hands of the draughtsmen.

The number of charts printed for the Royal Navy, for Government Departments, and to meet the demands of the general public has, during 1899, amounted to 451,088.

OBSERVATIONS ON THE AURORA AUSTRALIS.

By HENRYK ARCTOWSKI.

THE phenomena of the aurora australis are still very imperfectly known, as few systematic observations of the kind required have been made in the southern hemisphere. Dr. W. Boller,* in his catalogue of the appearances of the aurora australis recorded during more than 250 years (1640–1895), takes account of 1582 observations, corresponding to 791 different auroras. Most of these, however, have been described in a very imperfect manner. We are glad to be able to add something to the study of this phenomenon by the series of observations carried out on board the *Belgica* during the first winter ever passed in the antarctic regions.

We were throughout the winter at a considerable distance from the south magnetic pole, as the ship was caught in the ice on March 7, 1898, in 70° 27′ S. and 85° 44′ W. The constant movement of the ice, also, continually changed our position of observation; the extreme positions reached by the ship during the period when the aurora could be observed (March 11 to September 10) were 69° 52′ and 71° 36′ S. for latitude, and 82° 35′ and 92° 21′ W. for longitude. The observations were thus scattered over a region occupying about 10° of longitude and $2\frac{1}{2}$° of latitude. During our drift in the ice the atmospheric conditions were very unfavourable for observing the aurora, the amount of cloud being great.

The following figures show for each month the number of days with clear sky for several consecutive hours, *i.e.* with a maximum amount of cloud of 0 to 3 during part of the day:—

March.	April.	May.	June.	July.	August.	September.	Total.
15	14	8	16	22	15	14	104

After the end of September, the twilight in 70° or 71° S. is bright enough to conceal any appearance of the aurora. Despite all the disadvantageous conditions, we were

* W. Boller, "Das Südlicht," *Beiträge zur Geophysik*, iii. 56–130, 550–608.

able to observe the aurora sixty-one times during the winter of 1898; and on March 12, 1899, two days before escaping from the ice, it appeared again, so that the total number of appearances noted was sixty-two.

Our observations allowed us to establish the diurnal period of the aurora, for the phenomenon usually appeared between 7 p.m. and 2 a.m., and its maximum of intensity was most often reached between 9 and 10 p.m. It is obviously impossible to deduce the annual period from one year's observations; still, the accompanying table shows clearly enough that the maximum of frequency falls outside the months of the antarctic night, and that the intensity is distinctly greater at the equinoxes. In March and the beginning of April we observed fine displays of variable aspects, but in July, on the contrary, the auroras which were seen took the form merely of a luminous glow; later, in September, the auroras became once more very active and comparatively bright.

A remarkable circumstance brought out by these observations is the predominance of a homogeneous arc, which remained visible, almost without change, for many hours and always in the same quarter of the heavens. The arc usually reached to 8° or 12° above the horizon, and its extremities were nearly 45° distant from the bearing of the culminating point, which was always south-south-west. At the winter solstice the arc did not attain so great an altitude as at the equinoxes. It thus appeared that during the polar night the auroral phenomena withdrew towards a region nearer the magnetic pole.

TABLE OF AURORÆ AUSTRALIS OBSERVED ON BOARD THE "BELGICA" DURING THE WINTER OF 1898.

	March.	April.	May.	June.	July.	August.	September.
1	—	—	—	—	—	L.	—
2	—	—	—	—	—	—	Ad. S. R. V. P.
3	—	L.	A. V.	—	—	—	—
4	—	—	—	—	—	—	—
5	—	—	—	—	—	—	A.
6	—	Ad. R.	—	—	—	—	—
7	—	—	—	—	—	—	—
8	—	—	—	—	L.	—	L.
9	—	—	—	—	L.	—	S. A. R. Ad.
10	—	A. S. Ad.	—	A.	L.	—	R. S. A. Ad.
11	A.	L.	—	—	L.	—	—
12	A.	—	—	—	L.	—	—
13	—	L.	—	S. A. F.	L. A. S. O.	—	—
14	A. P. W. C.	A. S. O. V. R. P.	—	L.	—	—	—
15	—	A. S. Ad. R.	—	L.	L.	—	—
16	—	—	L.	—	—	L.	—
17	—	—	—	—	L.	—	—
18	—	—	—	—	—	L.	—
19	Am. V. P.	—	—	—	—	Ad. S.	—
20	A. R. V.	—	A. S.	—	—	L.	—
21	—	L.	L.	—	L. S. A.	—	—
22	—	L. A.	L.	A. S. R.	A. S.	—	—
23	L.	—	—	L. S.	A.	—	—
24	L.	L.	—	S. Ad.	L.	—	—
25	A. S.	S. A. R.	—	—	—	—	—
26	S. L. R. V. O.	—	—	—	—	A.	—
27	—	—	—	—	—	A.	—
28	L.	L.	—	—	—	—	—
29	A. S.	—	Ad.	—	—	—	—
30	—	—	—	—	—	—	—
31	A.	—	—	—	—	—	—

Explanation of Signs employed.

A = Homogeneous arc.	O = Obscure rays.
Ad = Double arc.	P = Streamers.
Am = Multiple arc.	R = Rays.
C = Crown.	S = Dark segment.
F = Flames.	V = Wavy ribbons.
L = Luminous glow.	W = Curtain.

It would be very interesting to know whether the familiar phenomena of the aurora borealis are repeated in every particular by the aurora australis. One might inquire whether there is a perfect similarity between the phenomena in the two hemispheres; if their distribution in regard to the poles is analogous; if the periods are the same, and if they coincide; and, finally, one might ask if the two phenomena are simultaneous. As yet we cannot reply with certainty to any of these questions. In order to identify the aurora borealis with the aurora australis, it would be necessary to make several series of observations at corresponding geographical points in the two hemispheres. It seems to me that the problem of the polar auroras can never be fully solved unless Weyprecht's idea of international co-operation for scientific research in the polar regions is taken up anew and extended this time to both the frozen areas of the globe.*

Yet, for the present, I may put forward the remarkable analogy between the aurora borealis as observed by Nordenskiöld on board the *Vega*, and the aurora australis as we were able to observe it on the *Belgica*. The *Vega* was imprisoned in the ice during the winter of 1878–79 in 67° 5′ N. and 186° 37′ E. The auroras observed during this wintering furnished Nordenskiöld with the data which served to establish his theory of the aurora borealis.† The year 1878 was a year of auroral minimum,‡ and 1898 was also very nearly a minimum year; moreover, the distance of Kolyuchin bay, the winter quarters of the *Vega*, from the north magnetic pole is nearly the same as that of the *Belgica* (about 71° S., 86° W.) from the south magnetic pole. §

It is remarkable that the aurora australis, as we observed it, presented exactly the same characteristics as the aurora borealis observed by Nordenskiöld on the *Vega*; his descriptions apply with literal exactness to the phenomena which we saw, and which will soon be described in the 'Scientific Results of the Belgian Antarctic Expedition.' The homogeneous arc with its dark segment is characteristic of both stations, and in the south, as in the north, it remained unchanged for hours. I therefore believe that our results compared with Nordenskiöld's will furnish the first elements of identification of the auroral phenomena of the two hemispheres, and that the theoretical considerations arrived at by Nordenskiöld for the arctic regions will be found to apply to the antarctic also.

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* H. Arçtowski, "The Problem of Antarctic Exploration," 'British Association Report,' Dover, 1899.

† 'Die Wissenschaftlichen Ergebnisse der Vega-Expedition,' Band i. pp. 226–272.

‡ Hermann Fritz, 'Das Polarlicht,' p. 117.

§ Position of the south magnetic pole according to V. von Haardt's map, 73° 38′ S., 146° 15′ E.

BARON TOLL ON NEW SIBERIA AND THE CIRCUMPOLAR TERTIARY FLORA.*

By P. KROPOTKIN.

This new paper of the well-known arctic explorer is of exceptional interest. After a few historical remarks relative to the exploration of arctic Siberia, Baron Toll briefly sketches the geology of the Verkhoyansk ridge and the plateau in the west of it. The ridge, in the upper course of the Yara, Dulgulakh, and Bytantai rivers, consists of black slates, of Devonian age, and sandstones—partly glauconite sandstones—belonging to the Mesozoic age, and specially to the so-called "Volga deposits." Both are considerably metamorphosed. In the upper and the middle courses of these rivers, Triassic slates (containing *Pseudomonotis ochotica*, Keyserling) prevail. They alternate with sandstones, and were traced up to 70° N. lat. Between Verkhoyansk (67° 32′ N.) and the junction of the Adicha with the Yana, Bunge found slates containing the *Gryphæa cf. dilatata*, which indicates the Liassic age of these slates. Liassic deposits were also found in 1893 on the Anábar.

Under 70° N., the Yana pierces the Kullar branch of the Verkhoyansk ridge, which branch shoots east-north-east, and consists of lower Triassic slates (*Hungarites triformis*, Mojs., and *Meecoceras affine*, Mojs.). Quartz porphyries pierce the Triassic slates, and granites constitute isolated heights, such as the Yngnakhkaya mountain (4297 feet) and the Kikhilyakh (3528 feet).

The Lena, from Bulun to its delta, flows in a valley between the Verkhoyansk ridge and the plateau which lies to the west of this ridge. Middle carboniferous limestones were found on the right bank of the Lena, opposite Stolbovyi island; and Upper Devonian slates, similar to the Dulgulakh slates, were found on the bank under 67° N. Palæozoic limestones appear at Kumaksurki, and are covered further down by limestones and slates, containing beds of coal. Lower Triassic slates were found on the Tas-ary island.

As to the plateau, which is watered by the Vilui, Olenek, and Anábar rivers, and probably also by the Khatanga, it stretches as far as the Yenisei, reaching the lowlands of West Siberia. Baron Toll gives it the name of "Central Siberian plateau," instead of which it would, perhaps, be better to retain the name of "High Plains of Siberia," proposed by the present writer, reserving the names of plateaus for the high plateaus of East Asia.

The average altitude of these "high plains" is about 1000 feet, and they are mainly composed of Cambrian and Silurian deposits. A little above Yakutsk the Cambrian deposits are followed by carboniferous sandstones of the "Volga deposits." These deposits appear also along the Lena up to 71° N., and westwards to the mouth of the Olenek, where they cover Triassic deposits. The "Czekanowski ridge," running west-north-west and west along the coast, is composed of them. As to the "Pronchischeff ridge," which runs further, from the Olenek to the Anabar, it consists exclusively of Mesozoic deposits—Lias, Volgian, Neocomian, and Oxford. The names of Czekanowski and Pronchischeff, which Baron Toll gives to these two ridges, are sure to be gladly accepted by geographers. At one spot at the mouth of the Chirima (64° N.), Tertiary deposits, of which more will be said presently, were found by Czekanowski.

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* "Sketch of the Geology of the New Siberian Islands, and the Main Problems in the Exploration of Arctic Regions," by Baron E. Toll, with two maps (*Memoirs of the St. Petersburg Academy of Sciences*, 8th Series, vol. lx., 1899. Russian).

The New Siberian islands occupy, as is known, the space from 73° to 76° 6′ N. and 136° to 160° E. long. The most northern and highest island is Kotelni. Its northern portions consist of Upper Silurian limestones, rich in corals. Similar deposits are known on the continent, especially on the upper Olenek. On Kotelni they form a series of folds running north-north-west, and Toll proposes for them the name of "Schmidt's ridge," thus rendering a well-deserved homage to the geologist and explorer of Siberia, Friedrich Schmidt. The southern part of the same island consists of Middle Devonian limestones and slates. At Bear cape Triassic deposits were found.* Diabases pierce the former, and olivine rocks shoot as dykes through the latter. The highest summit, Malakatyn-tas, 1200 feet high, consists of trapp. The New Siberia island, in the part explored by Toll, does not reach more than from 200 to 300 feet above the sea. The so-called "wood mountains" proved to be an excellent cutting through Miocene deposits, containing brown coal, and not deposits of modern driftwood. To the ridge formed by these Tertiary deposits Toll gives the name of "Hedenstrom's ridge." Only post-Tertiary deposits were found during a cursory visit to Fadeevski island.

The triangular shape of the great Lyakhovski island is due to granites (Bunge), while the Svyatoi Nos mountains on the mainland are either table-shaped or conical-shaped hills, made up of basalts. The Suruk-tas has well retained its volcanic form. These basalts are posterior to the Jurassic epoch. The glacial formations are represented on the southern coast of the Great Lyakhovski island by a lower bed, about 70 feet high, of ice, and an upper bed of clayey fresh-water deposits, always frozen, and containing tusks and pieces of the skin of the mammoth, as well as full frozen carcases of *Ovibos* and rhinoceros. Remains of horses, stags (the noble American stag), antelopes, *saigas*, and even of a tiger, were found in this bed. To prove that these animals lived and fed on the spot, a complete tree of *Alnus fruticosa*, 90 feet long, with all its roots, leaves, and fruits, was found. Similar deposits, as is known, are spread on the mainland. Speaking of the conditions of life of these animals we must remember, however—Toll remarks—the musk oxen of Greenland and the mammals of the high plateaus of Tibet.

Omitting a few remarks of Baron Toll concerning the structural origin of the ridges of the far north of Siberia, we shall dwell especially on what he has to say on the exploration of the Tertiary deposits *still further north, towards the pole*. Beds containing brown coal, and probably of the same age as those of the New Siberian islands, were found, as is known, by De Long on Bennett island. Besides, volcanic rocks were seen on this same island, and when Baron Toll sighted Sannikoff's Land from Kotelni island in 1886, he saw table-shaped mountains, the shape of which makes one believe that they must also have a volcanic origin, and that in the north of New Siberia there may be an archipelago, perhaps as big as that of Franz Josef Land. "Considering the geographical distribution of the Miocene plants in the arctic regions," Baron Toll writes, "we see that they appear in the shape of a complete ring around the pole, especially in Kung Karl's Land, on Spitsbergen, on the west and east coasts of Greenland, in Grinnel's Land, in Bank's Land, in Sitka, in Alaska, in Kamchatka, and finally on the Lena, at Kirimy-Phaya, in 67° N. The most northern spot where Miocene plants were found is 81° 45′, in Grinnell's Land. Captain Feilden, in 1876, during the British polar expedition, found there in the slates thirty species of plants, of which I shall only mention *Taxodium distichum*, or the marsh cypress, which now grows in the southern states of North America, a modern species of the pitch tree, and two fir trees; then the *Ulmus*

* List of fossils found are given in each case.

Corealis, a lime tree, two birch trees, two species of poplar, and so on. The yearly average temperature under which such a flora could grow must have been at least 46°·5 Fahr., while now the average temperature of this spot is only 6° below the Fahrenheit zero. How can we explain such a change of climate, and altogether the possibility of climatic conditions necessary for such a flora?

"Two probable hypotheses," Baron Toll continues, "were offered to explain the facts. One explains them by a different distribution of land and water, and the other by a change of position of the axis of rotation of the Earth, and consequently of the two poles and the equator. The renowned astronomer Schiaparelli has discussed the possibility of the latter hypothesis, and his conclusion was as follows: 'Astronomy does not deny the possibility of those considerable changes of latitudes which are claimed by geologists for the explanation of certain geographical facts.' Among the geologists, the late Dr. Neumayr expressed himself as follows: 'Let us imagine that the north pole has shifted, in the Ferro meridian, ten degrees in the direction of North-East Asia. The 70° of latitude would run then through Spitsbergen, Novaya Zemlya, the mouth of the Ob, and thence through Siberia to Irkutsk; it would pass then through the northern portion of the sea of Okhotsk and Kamchatka, cross the Pacific in the south of Behring strait, entering America at the mouth of the Copper river, and reach Greenland at the spot where the 78th degree of latitude issues now.' Nathorst, in 1888, accepting this idea, admitted that the pole must have been during the Tertiary period full 20° southward of its present position. Under this supposition, the Tertiary plants discovered by Czekanowski on the Lena at Pirimy-khaya, under 70° N. lat., would have been under the 78th degree of north latitude, and the small leaflets of a sickly aspect which he found would have been explained by the proximity of the spot to the pole. But how would this suggestion agree with our own finds in New Siberia? Perfectly well-developed and full-sized leaves of *Populus arctica* and *Populus Richardsoni*, Hr.; numerous fruits of the mammoth tree (*Sequoia Langsdorfii*, Brogt.); the leaves of several conifers (*Taxites tenuifolius*, Schm., *Taxodium distichum miocenum*, Heer), and so on, do not indicate at all a proximity to the pole, while under Neumayr's hypothesis this spot would be situated under 85° N. lat., and it would be near to this same degree of latitude under Nathorst's hypothesis. Consequently, then, the hypotheses are fully insufficient, and we must have *more* data than those which I could collect in 1886—not only from that spot, but also from the islands situated further north. As to the other rival hypothesis concerning the distribution of land and sea during the Tertiary period, still less can be said in its favour, *so long as all the globe, and especially the polar lands, have not been explored.*"

Baron Toll does not deny, of course, the usefulness of such hypotheses. On the contrary, they stimulate research; but the researches must necessarily be made. Besides, he points out that there are on the New Siberia islands distinct traces of glaciation, as also of elongated hills similar to the eskers of Courland, and of erratic boulders, brought perhaps from the Sannikoff archipelago, and he concludes for the necessity of exploring this archipelago in order to settle this question as well.

This paper is accompanied by two maps. One of these shows the position of both the pole and the 70th degree of north latitude, under the hypotheses of Neumayr and Nathorst. The other map is a large-scale geological map of the New Siberia islands, as well as those parts of the Yana, the Lena, the Olenek, and the Anabar, which were explored by Baron Toll's expedition.

A few words may be added to the important paper of Baron Toll. The necessity of exploring the Tertiary deposits in the far north, and especially in Sannikoff Land, as also in the land that was supposed to exist to the north-west of Novaya

Zemlya (Franz Josef's Land was not yet discovered at that time), and the far-reaching geological results which could be attained in this way, were indicated already as one of the main points of scientific interest in the report issued in 1871 by the Arctic Committee of the Russian Geographical Society, of which the present writer was the secretary. The discoveries of Czekanowski and Baron Toll have only added immensely to the interest of this question, by rendering the explanation still more difficult.

The whole question of the changes of climate on the Earth since the end of the Tertiary period—warm climate, even in high latitudes, at the end of the Tertiary period, immediately followed by glaciation, spreading to nearly equally low latitudes in North America and East Europe—continues to remain a puzzle for the geologist. And this question will remain unsolved until more data are supplied by the explorers of the globe in two different directions. Data of direct observation are of absolute necessity before any step can be made in the way of explanation, and these data must be of two distinct sorts. First of all, we must know how far north did the Tertiary vegetation spread, and in what direction it gradually lost its warm-climate character in proportion as it spread northwards. In this respect the exploration of Sannikoff's Land is *of the utmost value*, inasmuch as this problematic land is supposed to be situated almost on the opposite side of the globe (140° E. long.) to the spot of the Grinnel's Land (70° W. long.) where the Tertiary plants were found.

The other series of exploration must be directed to ascertain in how far *the glaciation of the southern hemisphere* was contemporary with the glaciation of our hemisphere, and *what was the climate in the equatorial regions during the same period*. So long as we do not possess reliable data in these two directions, all our hypotheses relative to changes of climate on the Earth, or of the Earth's axis, will possibly remain more than problematic.

One probable hypothesis relative to the possible cause of the Glacial period has been pointed out by the great physicist, Arrhenius; it is the increase of carbonic acid in our atmosphere, which would be sufficient to explain the cold period which our Earth lived through in the Post-Pliocene period. The numerous and large-scale volcanic eruptions towards the end of the Tertiary period, the traces of which have lately been discovered in immense quantities by the explorers of Siberia and Asia altogether, have brought a new argument in favour of the hypothesis of Arrhenius. These eruptions, which took place all over the immense border-ridges of the great plateau and on the plateau itself, certainly *must* have thrown masses of carbonic acid into our atmosphere. However, the hypothesis of Arrhenius, while giving a most valuable hint for the exploration of the Glacial period, leaves still the presence of Tertiary floras within 8° 15′ from the pole in Grinnel's Land and 16° in New Siberia quite unexplained. Only a full knowledge of this extraordinary flora and of its full extension in arctic regions—*in the American archipelagos as well as in the Siberian ones*—will permit physicists and astronomers to make a further step in the proper direction, and to suggest to the geologists a possible cause of such changes of climate as took place since the end of the Tertiary period.

THE MONTHLY RECORD.

THE SOCIETY.

The National Antarctic Expedition.—Since the President delivered his address, considerable progress has been made in the preparations for the National Antarctic Expedition. The commander and one of the

executive officers have been appointed; they are the "two excellent young officers" spoken of in Mr. Goschen's letter to the President (see p. 13). The commander is Lieut. Robert F. Scott, R.N., of H.M.S. *Majestic*, and the executive officer is Lieut. Charles Royds, R.N., of H.M.S. *Crescent*. As has already been stated, Prof. J. W. Gregory will be the chief of the scientific staff; other members of the staff will be Mr. T. V. Hodgson, of the Plymouth Biological Station, and Dr. R. Koettlitz, of the Jackson-Harmsworth Expedition. Prof. Pollock, professor of Physics in Sydney University, will be invited to join the staff. The name of the vessel will be the *Discovery*, a name which from the earliest times has been borne by ships of the British navy that have carried the British flag into unknown regions all over the globe.

Mr. John Coles.—The Council have decided to award to Mr. Coles the Murchison Grant for next year, as an acknowledgment of his services to geography during his long tenure of the offices of Map Curator and Instructor to the Society.

ASIA.

M. Bonin's Journey in Central Asia. — A letter from M. Bonin, dated "Karashar, December 31, 1899," is printed in the March number of *La Géographie* (cf. *Journal*, vol. xv. p. 417). From Liang-chau the traveller had crossed the parallel ranges of the Nan-shan to Kuku-nor, returning to Kan-chau by a new route. Afterwards he made his way by Su-chau and Ngan-si to Sha-chau, whence he pushed on westwards into the desert for a space of two degrees, and came near perishing for want of water. The only practicable route to Lob-nor proved to be that along the Altyn (or Astym) Tagh, presumably the one followed by Mr. and Mrs. Littledale in the reverse direction in 1893. In the westward reconnaissance, however, M. Bonin had the satisfaction of finding traces of the old commercial route between China and the west, followed, in his day, by Marco Polo. They consisted in towers in perfect preservation, and remains of a great wall and ancient city. During the journey along the Altyn Tagh, where considerable altitudes seem to have been reached, the party incurred many hardships from cold, want of water, and even of food, while no living human beings were seen until Lob-nor was reached. The meeting with Dr. Hedin, alluded to in our last number, took place on the banks of the Yange-kul. M. Bonin hoped to proceed from Karashar by a new route across the Tian-shan to Urumtsi, and thence to Kulja.

The Second Danish Pamir Expedition.—Lieut. Olufsen gave an account, in March last, before the Berlin Geographical Society, of his second expedition to the Pamirs, during which a winter was spent in the region of the upper Panj. The report of the paper appears in the *Verhandlungen* of the Society (1900, Nos. 2–3). The route of the expedition, as has been recorded from time to time in the *Journal*, led from Osh south by the Taldyk pass and the Kara-kul to the Alichur Pamir, which was followed down to the Yeshil Kul. Here a stay was made for some time, soundings being taken of the lake, and a survey of its surroundings made. The proceedings of the travellers, and especially the canvas boat in which the lake was navigated, made a great impression upon the Kirghiz, who believe that the waters are inhabited by various monsters. The examination of the Yeshil Kul and other lakes in its vicinity was made principally with a view to elucidating the apparent diminution of the water-supply of Western Turkestan. This Lieut. Olufsen connects with a gradual desiccation of the Pamirs, evidence of which was

seen in the fact that the lakes alluded to must once have formed a single body of water, with a circuit of some 125 miles. From Yeshil Kul, where ruins with Chinese inscriptions as well as Kirghiz memorials were examined, the expedition proceeded by the Khargosh pass to the Panj valley and Wakhan. Here special attention was given to the question of former habitation by the Sia-posh, which Lieut. Olufsen had before thought probable, and which he regards as proved without question by the additional researches made during this second expedition. Traces of this people were everywhere seen in the form of ruins of fortresses, while inscriptions and other remarkable antiquities were discovered. On the northward march to Khcrok, on the Gund river, where winter quarters were established, the leader made an interesting excursion across the eastern mountain chain, reaching a deep valley inhabited by a primitive race. During the winter, which set in in earnest in the middle of November, much information was collected relative to the ethnography of the region, while the regular course of events was varied by an excursion north to Kala-i-Wamar. The final start for the return journey was made on March 1, 1899, the country being still blocked by snow, and travelling extremely difficult. Night temperatures as low as 22° below zero Fahr. were experienced.

Kozloff's Expedition to Mongolia.—Further news respecting this expedition, the proceedings of which down to the arrival at Kobdo were described in the *Journal* for January last (p. 56), has since been received by the Russian Geographical Society (*Petermanns Mitteilungen*, No. 4). The examination of the Gobi-Altai region was concluded by detachments of the party, following different routes. M. Koznakoff followed the foot of the Altai from Kobdo to the meridian of Urga, crossing the range from time to time; while M. Ladygin was commissioned to attempt the passage of the Gobi by the route, hitherto untrodden by Europeans, from Uliasutai to Yui-min-sian. The leader himself hoped to cross the Gobi on the meridian of Lian-chau in the direction of the Edsin-gol river, afterwards passing through Alashan and joining the other detachments of his party before proceeding to Sining.

The Population of China.—A critical examination of the question of the population of China is made in the May number of the *Deutsche Rundschau* by Herr E. M. Köhler. Although himself closely acquainted with many parts of China, the writer makes no attempt at an original estimate of the density of population, holding that, however inexact the methods used by the Chinese authorities in their censuses, these must at least be more trustworthy than estimates on the part of foreigners, who generally know only a small part of the country. He quotes the figures given by Chinese chroniclers from the earliest times, giving in detail the results of the censuses of 1711, 1753, and 1812, and of an estimate made by the Marine Customs Department in 1882, which last put the total population of the eighteen provinces, in round numbers, as 380 millions. Not only, the writer holds, are the results of these censuses the most reliable existing, but the respective figures agree well with what might *à priori* have been anticipated from the course of Chinese history in the intervals between the censuses. Herr Köhler then proceeds, assuming the approximate correctness of the Chinese official figures, to consider whether the country must be held to be over-populated. This question he answers in the negative, showing the various directions in which China possesses exceptional advantages as regards food-production. Allowing for the fact that much of the soil is capable of producing two or even three harvests in the year, he finds that there are 2·75 acres of arable land per head of the population, an amount far greater than in most of the countries of Europe. In this again, however, he bases his result on a Chinese estimate of the area of arable land. Against this reliance on Chinese figures may be quoted the statement of Mr.

Colborne Baber (*Proc. R.G.S.*, 1883, p. 442) that the native census is "an authority which must seem utterly untrustworthy to any one acquainted with the lower class of Chinese officials who would be employed on such work." That parts, at least, of the country are over-populated, could hardly be denied by the writer, in the face of positive statements of travellers. Thus Mr. Litton, in his report on a journey in Northern Su-chuan, speaks of the widespread distress which must there follow even a slight failure of the crops.

New Light on an Old Country.—The publication of Mrs. Theodore Bent's recent volume* makes a valuable addition to the scanty literature of a most interesting country. By the sad death of her fellow-traveller, only four days after his return from his last journey, the task has devolved on her of putting together in connected form the varied information collected during repeated visits to Southern Arabia, with a personal narrative of the events of the journeys. This has been accomplished with much success, the material having been combined into a readable whole, derived partly from Mr. Bent's own papers and note-books, and partly from the journals kept by Mrs. Bent herself during the journeys. The most important part of the book is that devoted to the Hadhramut and Dhofar, the exploration of which was carried out in the winters of 1893–94 and 1894–95. Other sections, however, deal with the Bahrein islands, Maskat, the Fadhli country near Aden, and Sokotra, while the African coast of the Red sea, visited in 1895–96, is treated of in an interlude. So little has been hitherto known of Southern Arabia, that Mr. Bent's journeys, although confined within comparatively small compass, have added to our knowledge alike of the physical features, ancient history, and modern conditions of the country. An excellent description is given of the Akaba or elevated table-land, out of which have been cut, as by a knife, the main and branch valleys of the Hadhramut. These, in Mr. Bent's opinion, must have originally been due to the action of the sea. They have in course of time been silted up to a considerable height, possibly owing to the constant destruction of the myrrh and frankincense trees which has been going on for ages. The most interesting region visited was, however, that of Dhofar, respecting which the travellers are enthusiastic for the fertility of its valleys and mountains (the latter inhabited by the Gara tribe), and its delicious health-giving air. From an archæological point of view its interest is no less, for on its coast Mr. Bent believed that he could identify the ancient Abyssapolis frequented by the frankincense merchants, in the neighbourhood of a stupendous wall hung with stalactites, and described as the most magnificent natural phenomenon ever seen by the travellers. The harbour (not marked on the Admiralty chart) could easily be restored to its former condition, and, lying midway between Aden and Maskat, and on the only fertile stretch of the whole southern coast-line, might be capable of great development. Of the present condition of the natives of Southern Arabia the picture presented is anything but pleasing. The fanaticism of the Hadhrami is such as to make friendly intercourse next to impossible. Religion is the moving spirit of the place, and without it the whole Hadhramut would long ago have been abandoned as useless. One enlightened chief was, however, met with in the person of the Sultan of Shibahm, who has spent twelve years in India, and whose love for things Indian and English is unbounded. At Shibahm traces of very early occupation were discovered, the place having been the centre of the frankincense trade centuries before our era.

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* 'Southern Arabia.' By Theodore Bent, F.R.G.S., F.S.A., and Mrs. Theodore Bent. London: Smith, Elder. 1900.

AFRICA.

Dr. Donaldson Smith's Expedition.—Dr. Donaldson Smith sends a short account of his recent journey, of which the following is an outline. Starting from Berbera on August 1, 1899, he proceeded *viâ* Hargeisa and Milmil to the Shebeli, striking thence south-west in part by his route of 1895 across the Juba and Dana to the south end of Lake Stefanie. The Boran people were most friendly, and were anxious to be freed from the rule of the Abyssinians, who, however, had not been hard upon them. In various parts of the route un-mapped country was traversed, and near Stefanie some beautiful high mountainous country was explored. The survey work, carried out in part by Mr. C. Fraser, gave results coinciding satisfactorily with those obtained on the former journey. After visiting the great bend of the Omo, Dr. Smith pushed west, in about 5° 30′ N., with some deviations to the north or south caused by intervening ranges of mountains, some of which were very charming and supplied excellent grazing. No perennial rivers were crossed, only "Tugs" or Wadis.* After travelling a long distance, a great plain, extending west and north-west, was reached. It seemed to extend north to the Pibor and Sobat, and west towards Gondokoro. In the rainy season it is a marsh, and in the dry an impassable waterless desert, with nothing but loose cotton soil, full of cracks and holes and burning hot, the elevation being only 1500 feet. This was skirted along the foothills of some rich mountainous country until, on the meridian of Taransole, Dr. Smith turned sharp south to that populous town. Here the triangulation, of which an unbroken chain had been kept up from Lake Rudolf, was connected with Colonel Macdonald's surveys to Laluka. A westerly route was then taken to Fort Berkeley on the Nile, which was reached on March 15, 1900. Mr. Fraser took the men to Uganda and Mombasa, while, after waiting some time at the fort, Dr. Smith obtained a passage to Omdurman in Major Peake's steamer. The results of the expedition include, in addition to the surveys, extensive zoological, botanical, and ethnological collections. The fauna changed almost entirely after the Omo had been passed, and the species obtained, especially of birds, probably include many new to science.

Egypt in 1899.—Lord Cromer's reports to the Foreign Office on the finances, administration, and condition of Egypt and the Sudan in 1899 have recently been issued as a parliamentary paper. They show that, in spite of all drawbacks, the general progress made during the year was decidedly satisfactory. The accounts for 1899 show a surplus of £E.402,000, the revenue having reached the highest figure yet recorded since the British occupation. The value both of imports and exports, but especially the latter, showed a considerable rise as compared with 1898. The increase in exports was largely made up by the unusually large value of the export of cotton, due partly to the late enhanced prices, but partly also to an increase in amount. Cane-sugar likewise showed an increase both in quantity and in price. Eggs, a comparatively new item in the list, were exported to the value of £E.43,000. The railway traffic returns show a satisfactory increase in the transport of coal, machinery, timber, etc. Promising results have been obtained from the agricultural light railways, of which a length of 430 miles has been constructed since 1897, 209 miles having been opened for traffic in 1899. A large increase in receipts may be expected when the rolling stock has been made adequate to the demands upon it. The construction of agricultural roads also proceeds steadily, while difficulties in the way of the extension of the telegraph system are in a fair

* Dr. Smith must therefore class as such the Ruzi of Captain Wellby, which he must have crossed in this section of the route. He says, however, that the Wadis did not run with the Sobat.

way to be overcome by the formation of plantations of trees suitable for posts, young men being trained as foresters. The greatest obstacle to progress arose, of course, from the unprecedented failure of the Nile flood, and it speaks well for the value of the work accomplished in the direction of improved irrigation, that the ill effects of the low Nile have been kept within such small limits. On January 15, 1900, the discharge at Assuan was 578 cubic metres per second, as compared with 955 in 1889, the worst year previously known. Yet, assuming that a similar failure will not occur during the present year, no famine is to be feared, while the steady progress lately maintained in various directions has hardly received any serious check. The low Nile has favoured the operations for the great Nile reservoirs, good progress on which is reported. At Assuan, over 500 yards of the dam from the eastern bank of the river had been completed, before the end of 1899, to within 2 metres of its full height. The survey department, the work of which during 1898 was referred to in the *Journal* for December last (vol. xiv. p. 663), has continued its operations. The revenue survey of Sharkieh, Gharbieh, and Ghizeh, is almost completed, while the Sinai peninsula has been surveyed geologically, as well as the Fayum province. Good progress has been made with the Nile fish survey commenced in May, 1899. The report on the Sudan is hopeful, though the recent date of the final release of the country from Dervish thraldom precludes the possibility of great results at present. The population has wasted away under Dervish rule, and time must elapse before prosperity returns to the tribes. As regards the frontiers of the Sudan, good progress has been made with the delimitation on the side of Eritrea, and the general basis of an arrangement with Abyssinia in respect of the country west of the Blue Nile has been settled. Among the special points dealt with are the gum trade (which seems capable of development), railways and telegraphs, game preservation, anti-slavery operations, etc. The traffic in slaves has not yet been checked to any large extent, but it is hoped that vigorous measures will soon lead to more decided results.

The White Nile free of Sudd.—The successful completion of the task entrusted to Major Peake of removing the obstruction to navigation from the White Nile has lately been announced. That officer, who is now on his way home to England, reports that from Khartum to Fort Berkeley, on the upper Nile, navigation is now open throughout, and that this route will allow a saving of two months in the transport of supplies to Northern Uganda. This probably refers to existing circumstances, for on the completion of the Uganda railway the difference between the two routes could hardly be so great, though even so that by the Nile would appear to have the advantage for the parts of the Protectorate not immediately served by the railway.

The Harrison-Whitehouse Expedition.—A recent telegram announces the return to the coast of the Harrison-Whitehouse expedition to the countries south of Abyssinia. The attempt to strike westward from Lake Rudolf to the Nile was of necessity abandoned, owing to want of water and the uninhabited nature of the country, and the southward route to Mombasa *viâ* Baringo was adopted instead. The whole country around Lakes Rudolf and Stefanie was found to be deserted, its inhabitants having either died or left the country. The Europeans of the expedition enjoyed excellent health, and most of the baggage animals came safely through the journey. The leaders reached Bombay in the middle of June.

Count Leontieff's Expedition to Lake Rudolf.—A note in the April number of the *Geographische Zeitschrift* gives some particulars respecting Count Leontieff's latest expedition to the south of Abyssinia, from which he has now returned to France. The main object of the journey was, as is well known, to extend Abyssinian supremacy to Lake Rudolf; but results of value from a scientific point of

view are said to have been obtained also. The expedition left Addis Abeba in June, 1899, and reached the lake in August, after investigating the whole system of the Omo.

The Italian Somali Coast.—Information respecting the present condition and prospects of the southern half of the Italian Somali coast (known as the "Beradir" coast), is reproduced in Nos. 2–3 of the *Revista Geografica Italiana*, from a report by the Italian Consul at Zanzibar. Beginning from the north, the report describes successively the ports and stations of Adale, or Itala, Warsheik, Mogdishu, Merka, Brava, and Jumbo, at the mouth of the Juba, opposite the British station of Kismayu. At several of these, especially Mogdishu (the centre of government), Merka, and Brava, considerable commercial development has been noticeable within the last few years, though the actual amount of trade is nowhere great. The great want appears to be that of good anchorage, none of the ports affording good shelter for large ships, while even for native craft they are by no means favourable. Brava is the best situated in this respect, and the consul thinks that the anchorage might be still further improved. The wildness and treachery of the Somali tribes renders the agricultural development of the territory difficult, though land suitable for cultivation exists, the products capable of being grown including sanseviera, agave, coconuts, durra, sesamum, and cotton. The inhabitants are most peaceably disposed at Mogdishu, where almost perfect security prevails, both in the city and its environs. Its population amounts to about six thousand. Summing up, the consul is of opinion that even at present the Benadir coast need not be depreciated, but that improvements, in the direction of greater facilities for communication, and the development of new resources, are desirable. Much might be effected, it is thought, by means of irrigation, for which the Shebeli and Juba might be drawn upon.

Arrival of Major Gibbons on the Nile.—The arrival of Major Gibbons at Afuddi, on the White Nile opposite Dufile, on May 3, has been announced. The traveller, who, according to his programme, had made his way from the upper Congo *viâ* Lake Tanganyika, was awaiting the arrival of an Egyptian steamer to continue his journey northwards down the Nile. Major Gibbons's journey, which is thus practically brought to a successful close, will take a high place among the geographical achievements of recent years.

Physical Geography of the Ivory Coast.—An unusually clear idea of the physical geography of the Ivory Coast is given in the *Annales de Géographie* for March 15 by Captain Thomasset, a member of the railway survey party, headed by Captain Houdaille (cf. *Journal*, vol. xiv. p. 211). After enumerating the topographical results of the mission, which filled in considerable blanks in the maps between the Komoe and Bandama rivers, the writer goes on to sketch the surface features in their relation to geology and to the physical history of the region. He divides the country into a coast and a continental region, the line of partition being taken to be "the contour-line corresponding to the mean altitude of the littoral ridge which forms the actual shore-line." Although apparently an arbitrary line, this is said to agree closely with the ancient shore-line of this part of West Africa. It is extremely sinuous, running sometimes close to the sea, at others as much as 25 miles inland, so that the coast must formerly have been cut up by creeks and deep bays, although at the present day the shore is extremely regular. Taken as a whole, the old shore-line seems to have formed a shallow gulf extending from the Sassandra to Axim. In course of time a bar of sand was formed across the chord of the bay, whereupon the interior portions became gradually silted up by the material brought down by the rivers. A striking description is given of the configuration of the continental region, the surface of which is cut up into plateaux

with steep margins, furrowed by ravines and jutting out into promontories. Between them flow streams with tortuous courses, which unite into larger rivers flowing in alluvial plains of greater or less extent and generally swampy in the rains. This configuration extends inland at least to 7° N., the plateaux, however, becoming gradually more extensive and their margins less broken. Their relative height is not great, and no altitude greater than 600 feet has been found within 150 miles from the coast. The layer of surface soil is exceedingly thin,* in spite of the amount of decaying vegetable matter derived from the forests which cover the country. Captain Thomasset suggests that the rapid decomposition transforms much of the *débris* into gaseous or soluble substances, while the retention of any on the surface is, he thinks, due to the protective action of the forest.

The Congo-German Frontier in the Kivu Region.—An agreement between Germany and the Congo State, signed on April 10, provides for the delimitation of the common frontier of the two countries in the neighbourhood of Lake Kivu, in regard to which uncertainty has for some time prevailed, owing to ambiguity in the original agreement of 1885. According to former maps, the lake was placed to the west of the line as originally drawn, whereas recent explorations have shown that it lies to the east. Pending the settlement of the question (which is to be preceded by a survey of the territory by a mixed commission), instructions have been sent to the Congo officials to abstain from all political action in the region in question.

Preservation of Wild Animals in Africa.—A convention was signed in London on May 19 between the representatives of Great Britain, Germany, France, Italy, Spain, Portugal, and the Congo State, embodying the recommendations of a conference which met to consider the steps advisable for the preservation of wild animals threatened with extinction in Africa. The convention merely lays down principles which it is thought desirable to follow in furtherance of the end in view, the carrying out of suitable measures being left to the respective governments having possessions in Africa. The first article fixes the limits of the area affected by the decisions of the conference, the whole of Africa from 20° N. to a line following the northern boundary of German South-West Africa and the Zambezi being included. In the second article a number of means conducive to the preservation of wild animals are enumerated, and in the third the contracting parties bind themselves to introduce such measures into their African possessions. The remaining seven articles deal with miscellaneous points having reference to the carrying out of the convention. Among the measures suggested, the most important include prohibition of destruction in the case of (*a*) certain species either useful, as the secretary bird, or threatened with extinction, as the giraffe; and (*b*) the young, and females accompanied by young, of the elephant, rhinoceros, hippopotamus, zebras, buffaloes, and the various antelopes and gazelles; the limitation of the numbers killed when adult of the same animals and others, including small carnivores and monkeys, game and other birds, etc.; the establishment of game reserves and close seasons; prohibition of hunting without licence; imposition of export duties on hunting trophies; and the confiscation of all elephant tusks weighing less than 5 kilogrammes (11 lbs.). On the other hand, the application is recommended of measures for the sufficient reduction of the numbers of harmful animals, such as the larger carnivores, baboons, and crocodiles. It is, perhaps, matter for surprise that the same protection should be given to the rhinoceros, which in some districts is positively dangerous to life, as to such game as

* The same fact was remarked by Dr. Freeman in reference to the Ashanti forests, but the explanation given by the two writers differs, the British traveller attributing the thinness of the surface layer to the excessive rainfall.

antelopes, etc. Yet without such protection the animal would be in special danger of extinction, and the requirements of particular districts are, it may be supposed, met by the relaxation allowed in certain cases by Article III. This covers, in particular, the case of collection for scientific purposes.

Togoland.*—Recent activity in the various West African colonies has hardly, down to the present, given rise to a literature comparable with that relating to other parts of the continent. The publication of a work on one of the least known of these—Togoland—by an observer who, during a lengthened stay in the country, has had extensive opportunities of acquiring accurate knowledge, is therefore welcome. Although in the main based on personal observation, Herr Klose's journeys extended over so much of the territory, that the picture presented is a comprehensive one, while the author has supplemented his account from the information obtained by other travellers. Special weight has been given to all questions affecting the economic development of the territory, as to the possibilities of which the author holds sanguine views. He insists on the value to Germany of colonies capable of producing the tropical products needed for home consumption (among which he regards coffee as offering favourable prospects to planters), and points to the hardships and difficulties encountered in the early English and other colonies as proof that such may be successfully overcome by persevering effort. The book contains much valuable information on the natives of Togoland, whose manner of life, arts, and industries, etc., are fully described. Especial attention is given to the Bassari, who inhabit the interior of the country in the vicinity of 9° N., and among whom a German station was established. They have hitherto been little touched by outside influence. Their country marks the furthest advance southwards of the Fulbe herdmen, whom the author thinks it might be advisable to settle in the districts nearer the coast in order that they might introduce the rearing of cattle into them. On one of his journeys the author visited the site of the once flourishing market of Salaga, which he says has ceased to exist as such, and of which little remains to indicate its former importance. The book contains many excellent illustrations both of country and people, mainly from the author's photographs.

Geological Research in Northern Nyasaland.—Dr. Dantz, whose geological work in the northern parts of German East Africa has already been alluded to in the *Journal*, continued his investigations, at the end of 1899, in the region north of Lake Nyasa, and the main results of his journey are summarized in the first number of the *Mitteilungen aus den Deutschen Schutzgebieten* for the current year. As regards the main features of the country, Dr. Dantz's conclusions are in full agreement with those of Herr Bornhardt (*Journal*, vol. xv. p. 421). He characterizes the Rukwa depression as a typical rift valley ("Grabenverwerfung"), although the fact had been doubted by some geologists. It joins the main trough a little east of Utengule, the zone of junction being marked by the mountain group of Rungwe, Ngozi, etc., composed of basalt, trachytes, and other volcanic rocks. From the steepness of the sides of the Rukwa depression and the small amount of detritus found in their neighbourhood, Dr. Dantz thinks that the formation of the trough (and of the associated basalts and trachytes above mentioned) is a geologically recent event, and that the rainfall in this region was already scanty at the time. North of the Rukwa trough lies a mountain region of comparatively uniform elevation, all the streams of which—for the most part dry—trend towards the lake, and not towards the Ruaha. Dr. Dantz enumerates the principal geological formations met with, and also describes the sinter springs which occur in the valley of the Songwe.

* 'Togo unter Deutsche Flagge, Reisebilde und Betrachtungen.' Von Heinrich Klose. Berlin: Reimer. 1899.

AUSTRALASIA AND OCEANIC ISLANDS.

Voyage along the South Coast of New Britain.—A report by Dr. Schnee, representing the governor of German New Guinea, on a voyage made last year along the little-known southern coast of New Britain, appears in the first part of the *Mitteilungen aus den Deutschen Schutzgebieten* for 1900. The trip was made in company with Bishop Couppé in the mission steamer *Gabriel*, which left Herbertshöhe on November 18, and, rounding Cape Gazelle, ran along the coast to a point a little beyond Jacquinot bay. From Londip, halfway between Capes Gazelle and Palliser, to the south end of Jacquinot bay, the whole surface, both on the coast and in the interior, was found to be thickly covered with forest. Between Londip and Wide bay there are no villages on the shore, but plantations were seen on the mountains inland. From Wide bay onward, especially on the southern shore of the bay, many villages were seen, the people being generally friendly, though at first shy. In language, etc., they seem to have no connection with the inhabitants of the Gazelle peninsula. At Henry Reid bay, by which the neck of land uniting that peninsula with the mainland is narrowed on the south, the interior mountains sink to a plain, by which they appear separated from those of the main part of the island. Two streams which enter the head of the bay, one from the north-east, the other from the south-west, were ascended for some distance, but proved difficult of navigation. That from the north-east, known as the Henry Reid, has many eucalyptus trees on its banks. They were seen also in less numbers at the mouths of the smaller rivers. Coconut palms are entirely absent along the uninhabited part of the coast, and from Wide bay onwards they occur in small numbers only. It is hoped that the tribes of this coast may in time supply labour for the plantations, several individuals having at their own desire been taken to Herbertshöhe on board the steamer.

British New Guinea.—The annual report on British New Guinea for the year 1898–99 has lately been presented to Parliament. It perhaps contains less of strictly geographical matter than some that have appeared before, the governor's visits of inspection having been confined for the most part to the coast districts. Interesting trips by Government officers into the mountainous districts behind Port Moresby are, however, described. One of these, made by Mr. Ballantine, led by the road to the summit of the Astrolabe range into the district of the Hagari people, a mountain tribe which had previously been given to raiding, and had resisted the efforts of the authorities to bring them into amicable relations. Their country is extremely broken, and made up of steep hills and deep gorges, all clothed in dense forests. With the aid of friendly natives, the object of the expedition was achieved. About the same time an expedition under Messrs. Russell and Macdonald proceeded through a part of the same country to the "Gap," by which the main range is broken south-east of Mount Victoria, the principal object being to discover a suitable track for a road over the range. Beyond the Hagari villages unfriendly natives were encountered, but no fighting took place. From the summit of the Gap the party proceeded down the north face of the range to the Yoda, a tributary of the Mambare. The stream was crossed, but a retreat soon became necessary owing to the threatening attitude of the natives, whose attack had finally to be repelled by force. The Yoda bed was about 150 yards wide, but the river itself only 20 yards, and knee-deep. A definite conclusion as to the best route for a future road was prevented by the mountainous nature of the country, but the Gap itself seemed hardly capable of being traversed by pack-animals. From the Yoda to Tamaba station, on the Mambare, a good track could probably be found. The report on gold-mining does not show that any great results have been attained. The total yield of the Mambare or Gira field during the year is estimated at about

10,000 ounces. Gold has been recently found inland from Milne bay. A large area of land has been taken up by a company on the Musa river, where indiarubber is to form an object of cultivation. In the plantation of Messrs. Burns, Philp, & Co., on the Astrolabe range, at a height of 2600 feet, there are some twenty thousand growing plants of Arabian coffee, and more ground is being planted with seed. Sheep are being tried on the grassy hills. The desire on the part of the natives to live on friendly terms with the white men is said to be spreading, but the strength of the conservative instinct makes them slow to acknowledge the superiority of European ways. Where intellect has been sharpened, it is too often at the expense of character. Appendices to the report deal with a variety of matters—commercial, linguistic, meteorological, etc. The large-scale map of the possession, of which the four eastern sheets were issued with the previous report, is now completed by the publication of the nine relating to the centre and west.

British Agreement with Tonga.—By the Samoa agreement of last year, Germany waived all claim to political influence in the Tonga group, which, however, in the absence of a definite agreement with the native chiefs, did not at once become a British protectorate. An agreement has now been completed which virtually places the islands in that position, the conclusion of a treaty with any other power without the consent of the Queen being prohibited, while aid in case of need is only to be sought of Great Britain. It is said that the proclamation of an unconditional protectorate was opposed by the king alone, the majority of the chiefs being in favour of such a course.

The Future of the New Zealand Bush.—Canon P. Walsh, in a paper published in the last volume (vol. xxxi., 1898) of the *Transactions* of the New Zealand Institute, attempts to forecast the future condition of the New Zealand bush. In a previous paper appearing in the *Transactions* of the institute for 1896, the author drew attention to the extensive and rapid disappearance of the native bush in many parts of the country, and endeavoured to trace the principal agents which combine in the work of destruction. It was shown that the two chief factors, besides the axe of the bushman, are fires and cattle. By these means immense areas of forest have been destroyed, especially in the more settled districts. Great damage is at present being done throughout the districts of Taranaki, Manawatu, parts of the Wellington and Nelson provinces, and the Akaroa peninsula, where the native bush is said to be practically a thing of the past. It is pointed out that in all high altitudes, and especially in the mountainous districts of the south and west, the climatic and other conditions are favourable to the preservation of the bush in its virgin condition; while in numerous parts of the country the contending forces are nearly equally balanced, and those portions of the bush that will escape extinction will undergo a gradual but complete alteration in character and appearance. Often over large areas that have been wholly cleared a second growth appears, but this, both in size and variety, is said to be far inferior to the original bush. The most interesting and important constituent of the second growth is the tea-tree, which appears to thrive on almost all soils. Mention is made of the imported trees and shrubs, which have already added a new feature to the forest flora of the country. The author is hopeful that in a few years such terrible conflagrations as have lately overspread whole provinces will be things of the past. In predicting the appearance of the bush of the future, speaking generally, he says, "We may expect to see an infinite gradation between the portions which remain practically in their virgin condition on the mountain heights and sheltered gorges and the outlying fragments in the lower and cultivated districts, and that, in proportion as it is affected by the new conditions, the bush will be more clear and open, the trees fewer in variety, and of a shorter and bushier

habit. There will also be an increasing admixture of the foreign element, and less and less of the original undergrowth."

POLAR REGIONS.

The Peary Expedition of 1900.—A despatch dated June 9, from St. John's, Newfoundland, to the Brooklyn *Standard Union*, announces the completion of the repairs to the *Windward*, which had been in progress for some months, and sketches the programme for this year's voyage in support of Peary's north pole expedition. Although it has been found impossible to put new engines into the *Windward*, the whole machinery has been thoroughly overhauled, while the hull has been so strengthened that the ship is in better condition than she has been for some years. She will be commanded by Captain Samuel Bartlett, who took the *Diana* north last year. By special enactment of Congress, she will sail this year as an American ship, and will be the first arctic exploring vessel to fly American colours since Captain Hall's ill-fated expedition set out in the *Polaris* in July, 1871. According to the programme for the voyage, the *Windward* would sail from Sydney about July 1, proceeding, after a call at Disco, to Etah, in North Greenland, Peary's winter quarters, where either the explorer himself or instructions for future proceedings will probably be found. The *Windward* will take abundant stores of all kinds, including a large stock of coal and two completely equipped whale-boats. It is hoped that these additional supplies will enable Peary to complete his work, if indeed he has not already done so during the past spring. According to the last letter received from the explorer (dated August 28, 1899), he proposed to start north from Etah with the return of the sun, taking with him a large party of natives as far as Fort Conger, his advanced base, which should be reached in ten or twelve days. His further movements would depend upon conditions at the time, the alternatives being open of following the Greenland coast to its termination, and then striking north, or of starting north at once from Cape Hecla. Letters for Peary were sent early in the year to Dundee (Scotland), for conveyance to Cape York by the whalers. Beyond that point they would be forwarded by natives.

Relics of Sir G. Nares' Expedition.—Relics of the British Arctic Expedition under Sir G. Nares were sent home last year by Lieut. Peary, and have now been transmitted, as appears from the *Brooklyn Standard Union* of April 18, by the Peary Arctic Club to the Royal Naval College at Greenwich. They consist of the sextant left by Lieut. (now Admiral) Beaumont at Repulse harbour in 1876, and eight years later taken to Fort Conger by Lieut. Lockwood, of the Greely Expedition; and the record (dated September 7, 1876) left by Sir G. Nares on Norman Lockyer island. The sextant, which has remained in a wonderful state of preservation, was brought last year by Peary from Fort Conger to Allman bay, and thence despatched home in the *Diana*, together with the Nares' record, which, as regards both paper and ink, has remained unimpaired in the pure air of the northern regions. The relics were tendered to the British Admiralty in accordance with Peary's suggestion, and gratefully accepted by that body.

Payer's Map of Franz Josef Land.—The general accuracy of Payer's map of Franz Josef Land is once more championed, this time by Admiral von Brosch, one of the members of the Austrian expedition, in the *Mitteilungen* of the Vienna Geographical Society (1900, Nos. 1 and 2). The writer, who himself took part in the survey operations, describes the methods adopted in the triangulation of the newly discovered islands, and the astronomical work by which certain points were fixed. He insists that Dr. Nansen's own observations were not of a nature to entitle them to supersede the work of his predecessors, and though allowing that many small errors of detail would naturally occur in a survey such as Payer's, holds that the

groundwork of his map is certainly correct. The Austrian expedition made known Franz Josef Land as an island-complex, and the designation "land" attached to various parts of the same was never intended to imply the existence of continental areas. That heavy piled-up masses of sea-ice were taken by Payer, when seen from a distance, for the termination of a glacier is, the writer holds, easily intelligible.

Ice in Bering Sea.—The U.S. Hydrographic Office has recently issued a report on 'Ice and Ice-movements in Bering Sea during the Spring Months,' by Mr. James Page, of the division of Marine Meteorology, from which the following notes are extracted. Navigation of the waters to the northward of Bering strait is only possible during the months of August, September, and the early part of October, when the edge of the arctic pack-ice is generally found extending from Icy cape, on the coast of Alaska, westward to Herald island. Stretches of open water often reach as far as 25 or 30 miles to the northward of this island. Thence the edge of the ice extends in a south-westerly direction toward Cape North, on the coast of Siberia. Wrangell island appears to be at all times firmly enclosed within the limits of the pack. October 15 is regarded as the limit of the time during which it is safe for a vessel to be north of Bering strait. In this portion of the arctic young ice may form at any time after August 15. Port Clarence and St. Michael are ordinarily closed by ice by October 25. In mid-winter an impenetrable barrier of ice crosses Bering sea from east to west, starting at the head of Bristol bay, trending thence westward to a point some miles to the north of St. Paul island. Thence the direction of the barrier is north-westward into the bight on the Asiatic coast, between Cape Navarin on the north and Cape Orangutang on the south. The movement of the ice in Bering sea is closely connected with the direction of the prevailing winds, the majority of which, in this region, throughout April and May blow from the north-east, while throughout June southerly and south-westerly winds are prominent. Calms are most frequent during the winter months, reaching 14 per cent. during January. South-westerly winds occur in April, and mark the commencement of the retreat of the ice. To the northward of St. Lawrence island the ice remains impassable until late in the summer. The vessels of the Pacific Steam Whaling Company reach Unalaska in the latter part of March, and start northward about April 1–10. It is shown that the sea invariably opens along the west coast from Cape Bering to Indian point, and thence to East cape earlier than in any other portion. In conclusion, a brief summary is given of the actual conditions encountered during the years 1890–99, based mainly upon the reports contained in the log-books of the several vessels of the Pacific Steam Whaling Company, and a summary showing for each year since 1890, the date upon which each of the vessels entered the pack, the date of emergence into the clear water off Indian point, the route followed, and the date of arrival at Port Clarence.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

De la Métherie's Contributions to the Science of Physical Geography.—Prof. S. Günther, whose appreciation of the work of Lichtenberg in the field of terrestrial physics was lately referred to in the *Journal*, discusses, in the *Mitteilungen* of the Vienna Geographical Society (1900, Nos. 1 and 2), the influence of the old writer De la Métherie on the evolution of physical geography. He begins by remarking on the striking analogies which may be traced between the ideas of the present day and certain which were current 100 to 150 years ago. In his 'Théorie de la Terre,' published just over a century ago, De la Métherie brought together the whole scientific knowledge of the time, combined with deep

research on his own part, in a way which, Dr. Günther thinks, entitles him to be regarded as a forerunner of those modern modes of thought in which it is a fundamental axiom that the greatest effects may be brought about by causes imperceptible in themselves, if only the time during which they act is long enough. He may, therefore, be honoured as a pioneer in a new method of inquiry. Dr. Günther briefly reviews the theories put forward by De la Métherie in the work above mentioned with regard to the various branches of physical geography, showing how remarkably his views accorded in many ways with those of modern investigators. This tendency towards modern geographical methods is well seen in his treatment of phenomena in their genetic relations; his ideas as to lakes and their various modes of origin being specially worthy of notice. The phenomenon of the "Seiche" was already known to him. A pleasing characteristic, Dr. Günther remarks, in summing up, is his universal endeavour to adopt simple, rather than violent, explanations of observed geological facts.

Degree-measurement in Spitsbergen.—Some details as to the programme for the present summer of the combined Russian and Swedish operations for the measurement of a degree in Spitsbergen are given in the fourth number of the *Verhandlungen* of the Berlin Geographical Society for 1900. After taking on board, at Trondhjem, the last members of the Swedish scientific staff, including Dr. Larcén, Herr Engström, and Captain Ringertz, the *Svensksund* was to proceed *viâ* Tromsö to Spitsbergen, where the ice-conditions in the neighbourhood of the Great fiord would be first examined. After moving the Russian party from their winter station, the *Svensksund* would, if possible, run north-west to the Swedish station, and the definitive measurements in the northern area of triangulation would be at once commenced. In case of hindrance by ice, operations would be inaugurated further south. According to the programme arranged, the Russian party, which would arrive somewhat later, would begin the work of measurement in the Great fiord, but, in the possible case of the ice conditions being more favourable on the northern coast, would proceed thither to join the Swedish party. The greatest difficulties will be involved in the connection of the northern and southern areas of triangulation, for which purpose many difficult ice-covered ridges will have to be crossed. The return of the *Svensksund* is not expected before the beginning of September. The programme was decided on, according to the *Deutsche Rundschau*, by a conference at St. Petersburg, at which Sweden was represented by Baron Nordenskiöld and other Swedish savants.

The Dutch Deep-sea Expedition.—The third number of *Petermanns Mitteilungen* for the present year contains some information as to the proceedings of the *Siboga* expedition in the Malay archipelago during the latter part of 1899. Leaving Saleijer on October 26, Prof. Weber again crossed the Banda sea to Amboina by a new route, afterwards touching at Banda and the Ke islands *en route* for the Aru group. The proposed examination of Timor-laut was given up, owing to the news that three Dutch officers had been seized by the natives on the South coast of New Guinea, which made it necessary to return to Amboina for assistance. Unfortunately this arrived too late, the officers having been murdered before the arrival of the Dutch war-vessel, which had been at once despatched from Amboina. Prof. Weber's soundings prove that the Banda sea forms a deep depression, depths of over 2000 metres (1100 fathoms) being met with throughout, while east of the island of Banda a sounding of 5684 metres (3100 fathoms) was obtained. The depth of 4000 fathoms (7200 metres) marked on the charts seems to have been due to a confusion of metres and fathoms. Banda is not, as has been thought, connected with Ceram and Amboina by a submarine ridge, but rises independently

out of depths of over 4000 metres (2190 fathoms). In the east the Banda sea is shut in by lesser depths as far south as the Ke islands, but between the latter and Aru a channel reaching 3565 metres (nearly 2000 fathoms) supplies a connection with the Arafura sea. The final section of the cruise, from which Prof. Weber has now returned to Europe, was commenced on January 8, 1900 (*Petermanns Mitteilungen*, No. 5). Proceeding southward from Amboina, and again obtaining deep soundings in the Banda sea (2687 fathoms in 5° S.), the expedition ran along the south coasts of Timor and Flores to Sumbawa, afterwards touching at the Paternoster Kageang and Bawean islands *en route* for Surabaya. The most important discovery is that of the inaccuracy of existing maps of Timor, the south coast having been misplaced southwards, so that the size of the island has been exaggerated. The difference in one place is said to amount to almost 15′, and the true area to be smaller by one-eighth than has been hitherto supposed.

The Study of Scenery.—In his little book on the origin of scenery,* Mr. Marr renders a great service to students of geography as well as to geologists. At the same time the appreciation of natural beauty revealed in the work will commend it to many readers who may not be serious students. The book deals with the origin of scenery in general, and the illustrations are drawn from the whole world, thus allowing the best types of each characteristic form to be presented to the reader. As an introduction to Geomorphology, "a subject which has sprung from the union of geology and geography," as Mr. Marr puts it, it is the most systematic treatise yet published in the English language. After recapitulating a few of the main facts of geology, the author gives a series of chapters on the production and general structure of continents and ocean basins, and more detailed discussion of the various typical land-forms—mountains, valleys, lakes, volcanoes, plains, and plateaux, and on the specific action of ice and water on the land. Numerous references are given to the literature of the various subjects, and it is gratifying to notice the frequency with which Mr. Marr has referred to the pages of this *Journal* in the course of his descriptions.

GENERAL.

Geography at Oxford.—A further important step has been taken in the recognition of geography at Oxford University. In connection with the School of Geography there, the University has decided to institute a diploma in geography, which will be awarded, after examination, not only to Oxford students (male and female), but also to outsiders who have attended the school.

Geography in the University of London.—Parliamentary papers recently issued contain the Statutes, the Regulations, and a Report to accompany the Statutes and Regulations of the University of London, reorganized as a teaching body. The first regulation enumerates thirty-two projected boards of studies, one of which is "A Board of Geography for Physical Political and Commercial Geography," while another is "A Board of Economics and Political Science (including Commerce and Industry)." It is thus apparent that geography is intended to be recognized as a subject of primary importance, apart from such incidental consideration as it may receive under political science and commerce. Section 97 of the Statutes provides, "In the mean time and subject to any other order of the Senate the several boards of study enumerated in Regulation I. shall be appointed as soon as conveniently may be. In appointing the boards of studies the Senate

* 'The Scientific Study of Scenery.' By John E. Marr, M.A., F.R.S. London: Methuen & Co. 1900.

shall aim at securing to representatives of every subject of University study opportunity of expressing their views to the Senate." It is further provided that the members of each board shall be appointed annually by the Senate from amongst such members of a faculty as teach or examine in the subjects provided for in the board, with the addition of other persons which the Senate may think fit to appoint, but these "other persons" are not to exceed in number one-fourth of the members of the board. The Faculties of the University are fixed as eight in number, viz. Theology, Arts, Law, Music, Medicine, Science, Engineering, and Economics and Political Science (including Commerce and Industry). The question arises as to how the thirty-two boards of studies are to be distributed amongst the eight faculties, and this is particularly interesting as regards geography. The natural association would either be with the Faculty of Arts or that of Science. If put under the Faculty of Economics and Political Science, it would be in the anomalous position of being included as a portion of a sphere of learning of less scope than itself. The only teacher of geography recognized in the first list of members of the faculties is Mr. G. G. Chisholm under the Faculty of Economics. Nothing is said as to the provision of new professorships in the University, except that "so soon as the funds of the University permit the Senate shall found such professorships as it may think fit and prescribe the conditions on which they shall be tenable and may provide lecture-rooms museums laboratories workshops and other facilities for the purpose both of teaching and of research." While numerous educational bodies, of which University College and King's College are the chief, are admitted as schools of the University, there is also provision made that "the Senate may also admit any institution founded for the promotion of science or learning within the administrative County of London including the County of the City of London as a school of the University for the purpose of research or the cultivation of any special branch of science or learning." Thus it appears possible that geography may be included in the curriculum of the University of London, although the time when it will be so recognized is probably still distant.

Geographical and Geological Terminology.—A note in the *Revista Geografica Italiana* (1900, 2-3), by Olinto Marinelli, deals with the confusion which arises from the promiscuous use, in much of the geographical literature of the present day, of the same terms to denote the entirely different conceptions involved in the study of geographical and geological surfaces. The blame is due, in part, the writer thinks, to the tendency of geographers, or pseudo-geographers, who have no real acquaintance with geological principles, to adopt the technical terms applicable to geological phenomena, in the place of the more popular phraseology which naturally belongs to the orographical relief of a country. On the other hand, from the degree of analogy which exists between geographical and geological surfaces, geologists, whose vocabulary must of necessity be extensive, sometimes make use of popular terms to express purely geological conceptions. This may be admissible provided the sense is made clear by the addition of the words "geologic," "tectonic," etc., to the terms employed, whereas the use of such expressions as "syncline," "anticline," "fold," etc., in a geographical sense, is entirely to be deprecated. Signor Marinelli's remarks do not, of course, apply to strictly morphological terms, the use of which must be common to the two sciences, as they indicate mixed conceptions.

The "Silver Map" of Drake's Voyage.*—Mr. Miller Christy calls attention, in his recently issued monograph on the silver medallion illustrating

* 'The Silver Map of the World,' a contemporary medallion commemorative of Drake's great voyage. By Miller Christy. London: Henry Stevens. 1900.

Drake's voyage, to one of the most interesting cartographical relics of the latter part of the sixteenth century. Notice has previously been directed to the points of interest presented by the medallion as such, but its importance to students of historical geography has hardly been sufficiently recognized. Three copies are known to exist, two being now in the British Museum, to which they were presented by Sir Wollaston Franks, while the third is in private hands. Although at first sight resembling engraved work, the identity of the three in the smallest details proves them to have been cast or struck. Their diameter is a little under 3 inches, but, in spite of this small size, the geographical features are represented with surprising fullness and accuracy, and the map is evidently the work of a first-rate cartographer. It bears no fewer than one hundred and ten geographical names in the two hemispheres (one of which is shown on either face), besides various legends or inscriptions. Drake's route is shown by a dotted line, and the medallions were evidently struck in commemoration of the voyage. Mr. Christy discusses the question of the date and authorship of the map, placing the former at 1581, or the year after Drake's return, and showing the great probability that it was by the same cartographer as the map issued in Paris in 1587 to accompany Hakluyt's edition of Peter Martyr's 'De Orbe Novo.' The arguments in favour of quite such an early date can hardly be said to be conclusive, though there seems no doubt that the map dates from one of the last two decades of the sixteenth century. Again, while with reason rejecting the theory which attributes the silver map to Hondius, Mr. Christy seems hardly to attach weight enough to the resemblances between the latter's map illustrating the voyages of Drake and Cavendish and the silver map, which, especially in the Australian region, are such as to argue at least some connection between the two.* Mr. Christy says little about the general geography of the silver map, his chief attention being devoted to its delineation of the arctic regions. In this connection he shows the origin of the erroneous representation of Frobisher's discoveries on maps of the period, and enters into a discussion on Zeno's narrative and chart. The latter, he thinks, may have had more foundation in fact than Mr. Lucas believes, although he allows it to be fictitious in its connection with Zeno's story. Photographic reproductions of various contemporary maps, including the Paris map above alluded to, accompany the essay.

OBITUARY.

Miss Mary H. Kingsley.

We regret to record the death, announced by telegram from Cape Town early in June, of Miss Mary H. Kingsley, the well-known West African traveller, who early this year had proceeded to the Cape, and, having offered her services to the authorities at the military hospital at Simonstown, there contracted the illness of which she died. Miss Kingsley was the elder child of the late Dr. G. H. Kingsley, brother of Charles and Henry Kingsley, and himself the joint author (with the late Earl of Pembroke) of a well-known book of travel relating to the South sea. Devoting herself to scientific studies, she chose the West African coast lands as a field for original

* In addition to the representation of the southern continent, which in both cases may have been derived from Mercator's world-map of 1569, a striking agreement is seen in the positions assigned to the islands of the archipelago, and in the direction of Drake's route through the same. There is also much closer agreement in regard to the islands off the coast of California, than in the case of the Paris map, which does not, as Mr. Christy states, insert *all* the names contained in the Silver Map.

research in the subjects which exercised a special attraction for her, zoology and anthropology. Her work did not, therefore, lead her into any entirely unknown countries, and her contributions to geographical science were but incidental to her more definite labours in other fields. Still, she did much to bring before the public a clear understanding of the nature of the West African countries, for which, in spite of their many drawbacks, she continued to feel a surprising enthusiasm, her powers of observation and description rendering all she wrote unusually valuable and suggestive, although many might dissent from the particular views which she held. Returning from her second journey in 1895, Miss Kingsley prepared for publication a narrative of her experiences, which appeared in 1897 under the title 'Travels in West Africa.' Two years later she contributed a second volume, in some ways supplementary to the first, entitled 'West African Studies,' in which she treated at length of the fetish question and of various important subjects connected with the development of the West African colonies. The strong opinions which she held as to the government of these, while not perhaps likely to meet with general acceptance, have yet been of service in directing attention to an important subject.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1899-1900.

Anniversary Meeting, May 21, 1900.—Sir CLEMENTS MARKHAM, K.C.B., F.R.S., President, in the Chair.

THE Secretary read the minutes of the last Anniversary Meeting.

ELECTIONS.—*Wm. Belcher; Bertie Sadler Brockbank; Hy. Cawood Embleton; Morris N. Fuller; Sir Robert Grenville Harvey; Athole Burnett Reader; Alexander Richardson; Herbert Shaw; D. M. M. Crichton Somerville; Edward A. Reeves, Map Curator R.G.S.*

The presentation of the awards for the year then took place.

The PRESIDENT, addressing Captain H. H. P. Deasy, said: Captain Deasy, your admirable survey and exploring work while facing very great difficulties, hardships, and dangers, has won for you the highest honour that this Society has in its power to bestow. I think I know as well, or perhaps better, than most men what your difficulties were. They were not entirely confined to the physical aspects of the country, although these were difficult enough, but you had much to contend against in obstruction, perhaps not only from Chinese people, and in other ways. But, in spite of all these difficulties, you succeeded in exploring an entirely unknown part of Central Asia, and in mapping that country scientifically; so that your work has obtained the entire approbation of the Indian Survey Department. You have thus performed a great geographical feat; you have done very valuable geographical and, I believe, also political work. We cannot forget that you are a pupil of this Society, a very diligent pupil of Mr. Coles, and that you have done our Society great credit. I have very great pleasure in placing in your hands the Founder's Gold Medal.

Captain DEASY: Permit me to express my heartfelt thanks to you, Sir, and to the Council of this distinguished Society, for the great honour bestowed upon me in the bestowal of the Founder's medal, an honour which I highly value, as a mark of your appreciation of the work accomplished by me during the last four years in Central Asia, often in exceedingly difficult parts of the country. I rejoice also to have an opportunity of recording my grateful sense of the grant voted to me by this Society, after the examination of the maps made during my first journey, as also for

the valuable assistance afforded me at all times by you, sir, the Council, and the officers of this Society. I would especially associate with your name, Sir Clements Markham, those of Sir Thomas Holdich, Dr. Keltie, Mr. Coles, and Mr. Reeves, to whom are due my sincere thanks for the encouragement and assistance which mainly conduced to the success of my efforts. I need hardly add that no honour is more highly esteemed by explorers than that which you have conferred upon me, as it is well known that the awards of the Royal Geographical Society are conferred with absolute impartiality, irrespective of nationality, politics, or creed. The news of your grant reached me months after its bestowal, at a most opportune moment, when resting in Yarkhand after three unsuccessful attempts to explore in Sarikol. I was depressed; until then my work had not received the slightest recognition from the Indian Government; but this pecuniary help re-awakened my enthusiasm. I at once determined to prolong my journey for another year and make a fourth attempt to penetrate that very difficult part of Chinese Turkistan, the district of the Yarkhand river and the adjacent country. The bestowal of this honour upon me acts, and will act, as a powerful incentive to resume exploration as soon as my health is sufficiently re-established as to give me a fair chance of facing the severity of the climate of a country a very large area of which is of a greater altitude than Mont Blanc. Once more let me thank you sincerely for this mark of appreciation.

The PRESIDENT: Mr. James McCarthy has been for many years engaged in a survey of Siam. He has explored districts never before visited by Europeans; he has organized an efficient staff of surveyors; he has worked under circumstances of very great difficulty and danger. In looking at his memoir, I thought the dedication very pathetic: it was to his two English colleagues who had both fallen victims to their duty. The one was murdered by savage tribes, the other died of disease. But in spite of these difficulties Mr. McCarthy has at length completed his survey, the result of which is the first scientific map of Siam, a very valuable piece of geographical work, which not only does great credit to him, but also to the enlightened Government of Siam, which has employed him and furnished him with the necessary means. I place the Patron's Medal in the hands of Mr. McCarthy's friend, Mr. Warington Smyth, and he will kindly hand it to Mrs. McCarthy, who I see is present.

Mr. WARINGTON SMYTH: The Siamese minister, who intended to be here to receive the medal, but who is, unfortunately, unable to be present, desired me to express his regret, and at the same time his appreciation of the fact that this award should have been given to a servant of the Siamese Government; he feels it as a mark of honour to the Government which instituted the work, and as a compliment to his Majesty the king, who has taken a personal interest in the survey. It is a great pleasure to see Mrs. McCarthy back again from Siam, and to answer for my old friend and comrade, Mr. McCarthy. I know well that he has had to face great difficulties for many years, working with no encouragement; in fact, he was campaigning without the glory, and I am pleased to think that now he has won somewhat of the latter.

The PRESIDENT: Mr. Arctowski, for your excellent meteorological and oceanographical work in the Belgian antarctic expedition, our Council has awarded you the Murchison Grant. I watched your expedition from the first, and when I visited your commander, M. Gerlache, at Sandifjord, I discussed the various questions with him, and went over the *Belgica* with the greatest interest. I think that he displayed great energy in getting up his expedition with such small means. I well recollect, before you started, your coming to me and discussing the subject, when I had the great pleasure of making your acquaintance. At that time your expedition was the only one about to start for the antarctic regions. It has done

useful service to science, and you, by your soundings and meteorological observations, have performed very valuable geographical work.

Mr. Vaughan Cornish, when an able and accomplished geographer takes up one particular department of our science, and studies it with care during a series of years, he is sure to do extremely valuable work. This you have done by bringing your knowledge and your trained habit of observation to bear on questions as to the formation of sand-dunes and seabeaches; I may even say that you have founded a new department of our science, the department of kumatology. For these services the Council resolved to award you the Gill Memorial, which I beg to present to you.

The Council have had great pleasure in according to Mr. Robert Codrington, for his journey from Tanganyika to the Nyasa, the Back Memorial. Mr. Codrington was also asked to obtain, and has obtained with great trouble, that memento of Dr. Livingstone, the section of the tree under which the doctor's heart was buried, and arranged for it to be forwarded to this country.

Mr. A. T. Alldridge has done a great deal of work in the colony of Sierra Leone, and has been awarded the Cuthbert Peek Grant.

The President then delivered his Anniversary Address (see p. 1).

Visitors then withdrew, and, the President having appointed Captain Stiffe and Mr. Wm. Corner scrutineers, the election of the Council for the ensuing year was proceeded with. The honorary secretary, Major Darwin, read the report of the Council for 1899; this will be published in the Year-book for 1901.

The President then announced that the Council, as proposed, had been elected. The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President: Sir Clements Markham, K.C.B., F.R.S., F.S.A. *Vice-Presidents*: Hon. G. C. Brodrick; Right Hon. Sir George D. Taubman Goldie, K.C.M.G.; Colonel Sir Thomas Hungerford Holdich, R.E., K.C.I.E., C.B.; *Admiral Sir Anthony H. Hoskins*, G.C.B.; Admiral Sir F. Leopold McClintock, K.C.B., D.C.L., F.R.S.; General Sir Charles W. Wilson, R.E., K.C.B., K.C.M.G. *Treasurer*: Edward L. Somers Cocks. *Trustees*: Right Hon. Lord Avebury, F.R.S.; Sir Cuthbert E. Peek, Bart., F.R.A.S., F.S.A. *Honorary Secretaries*: Major Leonard Darwin, R.E.; James F. Hughes. *Foreign Secretary*: Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors*: *Major-General Sir John C. Ardagh*, K.C.I.E., C.B.; Sir H. E. G. Bulwer, G.C.M.G.; W. T. Blanford, LL.D., F.R.S.; Colonel George Earl Church; Clinton T. Dent; Major-General Sir Francis W. De Winton, R.A., G.C.M.G., C.B.; Admiral Sir R. Vesey Hamilton, G.C.B.; *Colonel D. A. Johnston*, R.E.; Colonel Augustus Le Messurier, R.E., C.I.E.; *L. W. Longstaff*; George S. Mackenzie, C.B.; *Admiral A. H. Markham*; *A. P. Maudslay*; Duke of Northumberland, K.G.; Sir George S. Robertson, K.C.S.I; Howard Saunders, F.L.S.; *General Sir Henry A. Smyth*, K.C.M.G.; Herbert Warington Smyth; Lord Stanmore, G.C.M.G.; Colonel Charles Moore Watson, R.E., C.M.G.; *Admiral Sir W. J. L. Wharton*, K.C.B., F.R.S.

THE ANNIVERSARY DINNER.

In the evening the anniversary dinner took place at the Hôtel Métropole. The President, Sir Clements Markham, was in the chair, and among those who were present as guests were the Lord Chief Justice of England, the Vice-Chancellor of the University of Oxford, Captain H. H. P. Deasy, Mr. James Bryce, M.P., Sir W. Phillimore, Admiral Sir William Graham, Sir George Kekewich, the Hon. J. R Dickson, General Sir John Ardagh, Sir Michael Foster, M.P., Sir John Cockburn, Sir Sidney Shippard, Sir Horace Tozer, Prof. Rücker, Sir Archibald Geikie, the Headmaster of Westminster School, Lieutenant Robert Scott, R.N., Mr. T. Leslie Cartwright, Prof. Pelham, M. Arctowski, and Sir R. Douglas Powell.

The PRESIDENT, after proposing the loyal toasts, next gave that of "The Navy and Army," for which Admiral the Hon. W. J. WARD and General Sir HENRY NORMAN responded.

The toast of "The Medallists" was also proposed by the PRESIDENT.

Captain DEASY said he felt that the absence of Mr. McCarthy was to be much regretted, the more so because he could not but be conscious of the fact that his lengthened services in Siam had added considerably more to the advancement of geographical science than his own had done. For himself, he was deeply sensible of the great honour conferred upon him by the Royal Geographical Society by its award of the Founder's Gold Medal. At no distant date Tibet would attract, and deservedly attract, in large measure the attention of the scientific and political world. It was earnestly to be hoped that in the near future the Indian Government would see its way to grant substantial assistance to competent explorers in Tibet, and not leave everything, or almost everything, as now, to private enterprise. In conclusion, he paid a high tribute to the assistance rendered to him by the Royal Geographical Society, but for whose aid he could not have achieved the results at which he had arrived. He also desired to acknowledge the help afforded to him by the officials of the Indian Government acting in their private capacity.

The Hon. G. C. BRODRICK proposed "Our Guests," to which the Lord Chief Justice and the Vice-Chancellor of the University of Oxford responded.

Major L. DARWIN proposed "The Sister Societies," coupling with the toast the name of Mr. J. G. Bartholomew (hon. sec. of the Royal Scottish Geographical Society), and the toast of "The President" was subsequently proposed by Sir MICHAEL FOSTER, M.P.

Thirteenth Ordinary Meeting, June 18, 1900.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*John Alexander; William Henry Cook; James Stokes.*

The Paper read was:—

"King Menelek's Dominions and the Country between Lake Gallop (Rudolf) and the Nile Valley." By Captain M. S. Wellby.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., LL.D., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria. *Globus* **77** (1900): 290–294. **Rhamm.**

Zur Entwickelung des slavischen Speichers. Von Karl Rhamm. *With Illustrations.*

On the origin of a particular type of granary in Slavonic villages.

Austria—Meteorology. ——

Jahrbücher der k. k. Central-Anstalt für Meteorologie und Erdmagnetismus. Jahrgang, 1897. Neue Folge xxxiv. Band. Wien: W. Braumüller, 1899. Size 12½ × 9½, pp. xxiv. and 146.

Austria—Tirol. *M.G. Ges. Wien* **43** (1900): 25–30. **Diener.**

Ueber den Einfluss der Erosion auf die Structur der Südosttirolischen Dolomitstöcke. Von Prof. Dr. C. Diener.

Denmark. ——

Den Danske Turistforenings Aarsskrift 1900. Kjøbenhavn: G. E. C. Gad, 1900. Size 9 × 6, pp. 128. *Illustrations. Presented by the Danish Tourist Club.*

The year-book of the Danish Tourist Club. An article on the "Dänische Nordseeküste," by R. Palleske, in *Globus* **77** (1900): 224–227, reproduces from this year-book pictures of the coast-dunes, and of a steamer which had been sunk and buried in the sand

Denmark—Meteorology. ——

Nautical-Meteorological Annual, 1899. Published by the Danish Meteorological Institute. Kjøbenhavn: G. E. C. Gad, 1900. Size 12½ × 9½, pp. xlvi. and 200. *Charts and Diagrams.* [In Danish and English.] *Presented by the Danish Meteorological Institute.*

Europe. *P.R. Artillery J.* **27** (1900): 1–22. **Maguire.**

The Strategic Geography of Europe at the Accession of Her Majesty Queen Victoria, and in 1899. By T. M. Maguire, LL.D. *With Maps.*

Europe—Anthropology. **Deniker.**

Les Races de l'Europe. I. L'Indice Céphalique en Europe. Par J. Deniker.—Association Française pour l'Avancement des Sciences, Congrès de Saint-Étienne. 26e Session 1897. Paris: Au Secrétariat de l'Association, 1899. Size 10 × 6½, pp. 120. *Map. Presented by the Author.*

The author points out that, classifying the cephalic index of the inhabitants, one can distinguish four regions in Europe—a dolicocephalic region in the north, a more markedly dolicocephalic region in the south, a very brachycephalic region in the centre of western Europe, and a less marked brachycephalic region in the east.

Europe—Anthropology. **Deniker.**

Les races de l'Europe. Par J. Deniker. (From *l'Anthropologie*, t. ix. pp. 113–133.) Size 10 × 6½. *Map. Presented by the Author.*

Europe—Anthropology. *Globus* **77** (1900): 217–220. **Schmidt.**

Die Verteilung der Kopfformen in Europa. Von Emil Schmidt. *With Map.*

The map shows in colours the prevalence of certain ranges of value of the cranial index in Europe.

Europe—Early Metallurgy. *Archæologia* **56** (1899): 267–322. **Gowland.**

The Early Metallurgy of Copper, Tin, and Iron in Europe, as illustrated by Ancient Remains and the Primitive Processes surviving in Japan. By W. Gowland. *With Illustrations.*

France. *B.S. Languedoc. G.* **22** (1899): 122–136, 239–277. **Gros.**

La Salvetat et ses environs. Par M. G. Gros. *With Illustrations.*

France—Chamonix. **Whymper.**

Chamonix and the Range of Mont Blanc. A Guide. By Edward Whymper. Fifth edition. London: John Murray, 1900. Size 7½ × 5, pp. xiv. and 206. *Maps and Illustrations. Price* 3*s. net. Presented by the Author.*

France—Floods. *B.S. Languedoc. G.* **22** (1899): 79–106, 185–215. **Duponchel.**
Les inondations et la charité collective. Par M. A. Duponchel.

On the inundations in different parts of France, with suggestions for reducing the risk of damage from floods.

France—Gard. *B.S. Languedoc. G.* **22** (1899): 107–121. **Rouville.**
Une station géologique, archéologique et médicale: Les Fumades (près Alais, Gard). Par P. G. de Rouville.

Description and history of the locality of the mineral springs of Alais.

France—Normandy. **Dearmer.**
Highways and Byways in Normandy. By Percy Dearmer, M.A. With Illustrations by Joseph Pennell. London: Macmillan & Co., 1900. Size 8¼ × 5½, pp. xiv. and 368. *Map. Price* 6*s. Presented by the Publishers.*

The description of a cycling tour in Normandy, or rather of the interesting places which were visited, the historical point of view predominating. The illustrations are from sketches; the map shows the route.

France—Place Names. *B.S.G. de l'Est* (1899): 111–120, 235–242. **Fournier.**
Des noms de lieux ayant pour racine les noms du dieu *Belen, Bel.* Par A. Fournier.

France and Belgium. **Gosselet.**
B. Union G. Nord de la France **20** (1899): 98–142, 193–256.
Géographie physique du Nord de la France et de la Belgique. Par J. Gosselet.

The physical geography of Flanders is considered under the head of eight provinces or districts.

Germany—Prussia. **Hellmann.**
Regenkarte der Provinz Ostpreussen. Mit erläuterndem Text und Tabellen. In amtlichen Auftrage bearbeitet von Professor Dr. G. Hellmann. Berlin: D. Reimer (Ernst Vohsen), 1900. Size 10½ × 7, pp. 26. *Map. Price* 1 *m. Presented by the Publisher.*

Contains statistics of ten years' rainfall in East Prussia, with a map of the mean annual rainfall in the province.

Rumania. *C. Rd.* **129** (1899): 894–897. **Martonne.**
Sur la période glaciaire dans les Karpates méridionales. Note de M. E. de Martonne.

Rumania. *C. Rd.* **130** (1900): 932–935. **Martonne and Murgoci.**
Sondage et analyse des boues du lac Galcescu (Karpates méridionales). Note de MM. de Martonne et Munteanu Murgoci.

This small lake, which has not hitherto appeared on any map, is situated in the Transylvanian Alps, and occupies a typical glacial cirque.

Russia—Finland. *Meddelanden G. Fören. Finland* **5** (1899–1900), (6): 1–86. **Rosberg.**
Sääksmäki Socken. Utkast till en geografisk sockenbeskrifning. Af J. E. Rosberg. *Plate.*

The author recalls the fact that a century, and even two centuries, ago many descriptions of parishes in Finland were presented to the Finnish University in Åbo as theses. Originally essentially geographical, these theses have become during the nineteenth century more and more historical. With the object of once more calling attention to the geographical value of these exercises, the author has prepared this detailed account of the parish of Sääksmäki, to which he appends a German abstract of four pages.

Russia—Railways. **Cooke.**
Russian Railways. Foreign Office, Miscellaneous No. 522, 1900. Size 10 × 6½, pp. 8. *Price* ½*d.*

On the length of Russian railways open and under construction in 1889 and in 1899, and on the new projects for railways in European Russia.

Scandinavia. *G.Z* **6** (1900): 129–139. **Kerp.**
Der Einfluss der Eiszeit auf das Natur- und Kulturbild der skandinavischen Länder. Nach Reisebeobachtungen. Von Heinrich Kerp. *With Illustration.*

Scandinavia—People. *Ymer* **20** (1900): 25–49. **Arbo.**
Er der foregået nye invandringer i Norden? Forsög på en anthropologisk besvarelse. Af C. O. E. Arbo. [French abstract.] *With Maps and Diagrams.*

An anthropological study as the result of which the author finds reasons to believe

that in every archæological period new cranial forms, previously unknown, made their appearance. He also adduces historical reasons for believing in the occurrence of successive immigrations into Scandinavia.

Spain. *B.S. Languedoc. G.* **22** (1899): 216–238. **Viala.**

Un voyage en Espagne. Par L. Fernand Viala.

A recent summer journey by a mining engineer in the south of Spain.

Sweden. **Andersson.**

Physische Geographie von Schweden, in ihren Hauptzügen dargestellt von Gunnar Andersson. (Sonderdruck aus "Schweden, Reisehandbuch herausgegeben von Schwedischen Touristenverein." 2 Aufl. Stockholm, 1900.) Size 7 × 4½, pp. 12. *Maps. Presented by the Author.*

A summary of this compact memoir is given in *Globus* **77** (1900): 272–276.

Sweden—Tourist Year-book.

Svenska Turistföreningens Årsskrift för År 1900. Stockholm: Wahlström & Widstrand. Size 8½ × 5½, pp. viii. and 422. *Map and Illustrations. Presented by the Svenska Turistföreningen.*

The annual publication of the Swedish Tourists' Club, the object of which is to popularize Sweden as a holiday resort.

Switzerland. *B.S. Neuchatel G.* **12** (1900): 66–218. **Pittard.**

Anthropologie de la Suisse. Étude de plusieurs séries de crânes anciens provenant de diverses régions de la vallée du Rhône (Valais). Par Eugène Pittard.

Switzerland. *B.S. Neuchatel. G.* **12** (1900): 37–65. **Schenk.**

L'Ethnogénie des populations helvétiques. Par le Dr. Alexandre Schenk.

A study of the origin of the Swiss people, mainly from craniometric observations.

Switzerland—Ticino Valley. *Appalachia* **9** (1900): 136–156. **Davis.**

Glacial Erosion in the Valley of the Ticino. By W. M. Davis. *With Illustrations.*

Prof. Davis was struck with the fact that the lateral valleys of the Alps were out of adjustment with the main valleys into which they flow, and he attributes this condition to the influence of glacial erosion in the main valleys.

Switzerland—Zermatt. **Whymper.**

The Valley of Zermatt and the Matterhorn. A Guide. By Edward Whymper. Fourth edition. London: John Murray, 1900. Size 7½ × 5, pp. xiv. and 224. *Maps and Illustrations. Price* 3*s. net. Presented by the Author.*

United Kingdom. *J.R. Agricultural S.* **11** (1900): 19–34. **Crawford.**

The Food Supply of the United Kingdom. By R. F. Crawford.

United Kingdom—Earthquakes. *Geolog. Mag.* **7** (1900): 106–115, 164–177. **Davison.**

On some Minor British Earthquakes of the Years 1893–1899. By Charles Davison, Sc.D. *With Diagrams.*

United Kingdom—England. *P.S. Antiquaries* **17** (1898–99): 221–224. **Hope.**

Notes on the Walls of Southampton, and recent proceedings relating thereto. By W. H. St. John Hope. *With Plan.*

United Kingdom—Rainfall. **Scott.**

The Diurnal Range of Rain, at the Seven Observatories in connection with the Meteorological Office, 1871–1890. By Robert H. Scott, D.Sc., F.R.S. London: Eyre & Spottiswoode, 1900. Size 10 × 6½, pp. 40. *Diagrams. Price* 2*s.* 6*d. Presented by the Meteorological Office.*

A statement of the mean hourly rainfall at seven meteorological stations for a period of twenty years.

United Kingdom—Scotland. *Scottish G. Mag.* **16** (1900): 193–235. **Murray and Pullar.**

A Bathymetrical Survey of the Fresh-water Lochs of Scotland. By Sir John Murray, K.C.B., D.Sc., etc., and Fred. P. Pullar. *With Maps and Illustrations.*

This paper was also published in the *Geographical Journal* for April, pp. 309–352.

ASIA.

Asia—East and Central. **Obrucheff.**

Central Asia, Northern China, and the Nan Shan. Report of expeditions carried out for the Imperial Russian Geographical Society in 1892–94. By V. A. Obrucheff.

Vol. i.—Journey through Eastern Mongolia, Chi-li, Shan-si, Shen-si, and Kan-su, Ordos, Alashan, and Eastern Nan Shan. (Edited for the Imperial Russian Geographical Society by J. V. Mushketoff.) [In Russian.] St. Petersburg: Printed by M. M. Stasyulevich, 1900. Size 12½ × 9, pp. xxxviii. and 630. *Maps and Illustrations. Presented by the Imperial Russian Geographical Society.*

China. *Petermanns M.* **46** (1900): 12–18. **Bretschneider.**

Potanins letzte Reise in West-China und im osttibetanischen Grenzgebiete im Jahre 1893. Mit Anmerkungen von Dr. E. Bretschneider. *With Map.*

Notes and criticism of Potanin's journey in Sechuan and on the borders of Tibet in 1893.

China. *Deutsche Rundschau G.* **22** (1900): 337–347. **Köhler.**

Kritische Studien zur Bevölkerungsfrage Chinas. Von E. M. Köhler.

The total population of the Chinese empire is here estimated at 450,000,000.

China. *La G., B.S.G. Paris* (1900): 267–288. **Leclère.**

Géographie générale des provinces Chinoises voisines du Tonkin. Par M. A. Leclère. *With Illustrations.*

China. *Rev. G.* **45** (1899): 347, 418; **46** (1900): 25, 107. **Barré.**

La Chine entr'ouverte. Sa perfectibilité. Par M. Paul Barré.

China. *B.S. d'Études Colon.* **7** (1900): 1–23, 71–100. **Leval.**

La Chine d'après des auteurs récents. Par M. G. de Leval. *With Illustrations.*

A resumé of recent writings on the resources of China and the prospects for European trade.

China. *J. United Service I. India* **29** (1900): 1–28. **Wingate.**

"Things Chinese." With a short account of a journey through the Heart of China. By Captain A. W. S. Wingate. *With Map and Sections.*

The journey referred to was described in the *Geographical Journal*, vol. xiv. (1899), p. 639.

China—Anthropology. **Talko-Hryncewicz.**

Travaux de la Sous-Section Troïtzkossawsk-Kiakhta Séction du pays d'Amour de la Société Imperiale Russe de Géographie. Tome ii., Livraison 3, 1899. Notes sur l'Anthropologie des Chinois du Nord. Les Chinois de Maïmatchen de Kiakhta et d'Ourga. Por J. de Talko-Hryncewicz. (In Russian.) Moscow, 1899. Size 10× 7, pp. 82. *Illustrations.*

China—Chekiang. **Werner.**

Trade of Hangchow for the year 1898. Foreign Office, Annual No. 2377. 1900. Size 10 × 6, pp. 10. *Price* 1*d.*

China—Chekiang. **Wilkinson.**

Trade of Ningpo for the year 1899. Foreign Office, Annual No. 2421, 1900. Size 10 × 6, pp. 10. *Price* 1*d.*

China—Manchuria. **Hosie.**

Trade of Newchwang for the year 1898. Foreign Office, Annual No. 2369, 1899. Size 10 × 6, pp. 18. *Price* 1½*d.*

This report contains a short account of the Manchurian railway.

China—Manchuria. *Imp. and Asiatic Quarterly Rev.* **9** (1900): 287–313. **Parker.**

Russia's Sphere of Influence; or, a Thousand Years of Manchuria. By E. H. Parker.

Eastern Asia—Typhoons. *Meteorolog. Z.* **17** (1900): 71–74. **Bergholz.**

Ueber Bildungsstätten, Bahnen, und Zonen der Orkane des "Fernen Ostens." Von Paul Bergholz.

French Indo-China. **Lagrillière-Beauclerc.**

A travers l'Indo-Chine, Cochinchine, Cambodge, Annam, Tonkin, Laos. Par Eug. Lagrillière-Beauclerc. Paris: Ch. Tallandier [1900]. Size 10 × 6½, pp. viii. and 252. *Map and Illustrations. Price* 6 *fr.*

This description of French Indo-China and of its several provinces is the result of a visit to the country in order to study its condition, at the instance of the French Colonial Office.

French Indo-China—Tonkin. *Rev. Maritime* **144** (1900): 5–66. **Lhomme**

A travers le Tonkin: La rivière Claire. Par M. G. Lhomme. *With Maps.*

India. *J.R. Asiatic S.* (1900): 261–291. **Baden-Powell.**

The Villages of Goa in the Early Sixteenth Century. By B. H. Baden-Powell.

Particulars taken from an official Portuguese charter in 1526.

India—Assam. ———

Report on the Administration of the Province of Assam for the year 1898–99. Shillong, 1899. Size 13 × 8½, pp. xvi., 210, and cccvi. *Maps.*

India—N.-W. Frontier. **Hoghton.**

Operations of the Mohmand Field Force in 1897. Compiled . . . by Captain F. A. Hoghton. Simla, 1899. Size 13½ × 8½, pp. vi. and 82. *Maps.*

India—N.-W. Frontier. **Kemball.**

Operations of the Tochi Field Force in 1897–98. Compiled . . . by Major G. V. Kemball. Simla, 1900. Size 13 × 8½, pp. iv. and 78. *Maps and Plate.*

India—N.-W. Provinces and Oudh. ———

Report on the Administration of the N.-W. Provinces and Oudh, for the year ending 31st March, 1899. Allahabad, 1900. Size 13½ × 8½, pp. iv., xl., 198, and 200.

India—Punjab. ———

Report on the Administration of the Punjab and its Dependencies for 1898–99. Lahore. Size 13 × 8½, pp. xiv., 280, and ccxlii. *Map and Diagram.*

Malay Archipelago—Java. **Wit.**

Facts and Fancies about Java. By Augusta de Wit. Second edition. The Hague, W. P. Van Stockum & Son; London: Luzac & Co. 1900. Size 8½ × 5½, pp. 266. *Illustrations. Price 7s. 6d. net. Presented by the Publishers.*

Pleasantly written sketches of life, both Dutch and native, in Batavia, Buitenzorg, and other parts of Java.

Malay Archipelago—Sumatra. **Hasselt.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 67–93.

De inlijving der V. Kota-Kampar. Door A. L. van Hasselt. *With Map.*

On the new Dutch district of Kota Kampar, which was established in September, 1899, on the Kampar river.

Malay Archipelago—Sumatra. **Pleyte.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 1–48.

Herinneringen uit Oost-Indie, Soematra's Westkust. Door C. M. Pleyte.

Describes a visit to Baros *viâ* Poelau Tèlo.

Persia—Lake Urmi. **Günther and Manley.**

On the waters of the Salt Lake of Urmi. By R. T. Günther, M.A., and J. J. Manley. (From the *Proceedings of the Royal Society*, vol. 65.) Size 8½ × 5½, pp. [8.] *Presented by R. T. Günther, Esq.*

Analyses of two samples of water from the salt lake Urmi, the most remarkable feature of which appears to be the absence of carbonates and silicates from the dissolved salts, which seem to be entirely chlorides and sulphates.

Persia and Afghanistan. *Nineteenth Century* **47** (1900): 413–424. **Gordon.**

The Problem of the Middle East. By General Sir Thomas Gordon, K.C.I.E.

Russia—Caucasus. **Raddle.**

Grundzüge der Pflanzenverbreitung in den Kaukasusländern von der unteren Wolga über den Manytsch-Scheider bis zur Scheitelfläche Hocharmeniens. Von Dr. Gustav Radde.—Die Vegetation der Erde. Sammlung pflanzengeographischer Monographien herausgegeben von A. Engler und O. Drude. III. Leipzig: W. Engelmann, 1899. Size 10½ × 7, pp. xii. and 500. *Maps and Illustrations. Price 23s.*

Russia—Central Asia. *Ann. G.* **9** (1900): 119–140. **Saint-Yves.**

Dans le Tian Chan Russe. Second article. De l'Issyk Koul au Ferghana. Par M. G. Saint-Yves. *With Illustrations.*

Russia—Pamirs. *Verh. Ges. Erdk. Berlin* **27** (1900): 134–150. **Olufsen.**

Herr Oberleutnant O. Olufsen: Die zweite Dänische Pamir-Expedition. *With Map.*

A journey through the Russian Pamir, including Shignan and Roshan in 1898–99.

Turkey—Palestine. *B.S.G. Genève* **39** (1900): 19–27. **Naville.**
Jérusalem ancienne. Par M. Th. Neville. *With Plan.*

Turkey—Yezidis. *B.S. Neuchatel. G.* **12** (1900): 275–301. **Spiro.**
Les Yezidi ou les adorateurs du Diable. Par Jean Spiro. *With Map.*

Describes the sect of Yezidis, with a sketch-map showing the distribution of the groups of these people which now exist.

Western Asia—Historical. *B.S. Neuchatel. G.* **12** (1900): 261–274. **Reclus.**
La Phénicie et les Phéniciens. Par Élisée Reclus. *With Map.*

AFRICA.

Abyssinia. **Blundell.**
A Journey through Abyssinia to the Nile. By Herbert Weld Blundell. (From the *Geographical Journal* for February and March, 1900.) Size 10 × 6½, pp. 34. *Map and Illustrations.*

African Travel. **Foà.**
De l'Océan Indien à l'Océan Atlantique. La traversée de l'Afrique du Zambèze au Congo Français. Par Édouard Foà. Paris: Plon-Nourrit et Cie, 1900. Size 7½ × 5, pp. xii. and 324. *Map and Illustrations. Price 4 fr. Presented by the Publishers.*

This volume describes the author's journey from the Zambezi, through the region west of Lake Nyasa, and finally by Lake Tanganyika and the Congo to the sea, carried out between 1894 and 1897.

Basutoland. ——
Basutoland. Report for 1898-9. Colonial Reports, Annual No. 288, 1900. Size 10 × 6½, pp. 56. *Price 3d.*

Basutoland. *T. Liverpool G.S.* (1899): 30–35. **Fairclough.**
Expedition to the Mont Aux Sources, Basutoland. Communication from T. Lindsay Fairclough.

British East Africa—Mount Kenya. **Mackinder**
A Journey to the Summit of Mount Kenya, British East Africa. By H. J. Mackinder, M.A. (From the *Geographical Journal* for May, 1900.) Size 10 × 6½, pp. 34. *Maps and Illustrations.*

Central Africa. **Codrington.**
A Journey from Fort Jameson to Old Chitambo and the Tanganyika Plateau. By Robert Codrington. (From the *Geographical Journal* for March, 1900.) Size 10 × 6½, pp. 8. *Map.*

Egypt. **Boddy.**
From the Egyptian Ramleh: Sketches of Delta Life and Scenes in Lower Egypt. By the Rev. Alexander A. Boddy. London: Gay & Bird, [1900]. Size 8½ × 5½, pp. xvi. and 440. *Map and Illustrations. Price 7s. 6d. net. Presented by the Author.*

A personal record of a residence in Lower Egypt, with a large number of "snap-shot" photographs, giving an intimate idea of the author's everyday life in Egypt.

Egypt—The Senussi. *Nineteenth Century* **47** (1900): 400–412. **Threlfall.**
Senussi and his threatened Holy War: a Warning. By T. R. Threlfall.

Account of the origin of the Senussi sect, and forecast of the probable schemes of the present leader.

Ivory Coast. *Ann. G.* **9** (1900): 159–172. **Thomasset.**
La Côte d'Ivoire. Par le Capitaine Thomasset, de la mission Houdaille. *With Maps.*

Nigeria—Lower Nigeria. **Moor.**
Niger Coast Protectorate. Report for 1898–9. Colonial Reports, Annual No. 289, 1900. Size 10 × 6, pp. 34. *Price 2½d.*

It is noted incidentally in this Report that the Europeans who stand the climate of the Niger coast best, are those of the fair type with sound teeth and not under twenty-two years of age.

Portuguese East Africa. *B.S. Neuchatel. G.* **12** (1900): 306–315. **Grandjean.**
Le bassin du Nkomati et sa communication avec le Limpopo. Par A. Grandjean. *With Map.*

Portuguese East Africa. *B.S. Neuchatel. G.* **12** (1900): 316–341. **Grandjean.**
La cartographie de la province de Lourenço Marques. Par A. Grandjean.

Portuguese East Africa—Delagoa Bay. *Ann. Hydrographie* **28** (1900): 151–160. ———
Die Delagoa-Bucht.

South Africa—Bibliography. **Cotgreave.**
The Transvaal and South Africa. A Collection of References to Books containing articles on the above subject which appear in Cotgreave's "Contents-Subject Index to General and Periodical Literature," together with a list of special works dealing with South African Affairs. London: West Ham Public Libraries, 1900. Size 7 × 5, pp. 12. *Presented by the Compiler.*

South Africa—Boers. *Rev. Scientifique* **13** (1900): 299–306. **Fournier de Flaix.**
Les premiers Boers. Par M. E. Fournier de Flaix.
An account of the formation of the Boer race by the successive colonization of South Africa by the Dutch and French.

NORTH AMERICA.

Alaska. ———
The Russian-American Mining and Exploration Company, Alaska Territory, 1900. Size 10 × 7, pp. [24]. *Map.*

Bermuda. *American J. Sci.* **9** (1900): 313–340. **Verrill.**
Notes on the Geology of the Bermudas. By A. E. Verrill. *With Map and Illustrations.*

Canada—Bay of Fundy. *Ann. Hydrographie* **28** (1900): 181–186. **Schott.**
Sprungwelle und Fluthgrösse im oberen Theil der Fundy-Bai. Nach einem Kanadischen Amtlichen Bericht bearbeitet von Dr. G. Schott. *With Map.*

Canada—British Columbia. **Monckton.**
Mining Districts near Kamloops Lake, British Columbia. A paper read before the Institution of Mining Engineers. By G. F. Monckton. Annual General Meeting at Sheffield, September 19, 1899. Excerpt from the Transactions of the Institution of Mining Engineers. London and Newcastle-upon-Tyne: A. Reid & Co., 1899. Size 10 × 6½, pp. 18. *Sketch-map, Plan, and Illustrations. Presented by the Secretary of the Institution.*

Canada—British Columbia. *Appalachia* **9** (1900): 156–165. **Vaux.**
The Great Glacier of the Illicilliwaet. By George and William S. Vaux, Jr. *With Map and Plate.*
Records a series of careful measurements as to rate of flow, recession, and change in appearance of the famous glacier at Glacier station, on the Canadian Pacific Railway.

Canada—Nova Scotia—Tides. **Dawson.**
Illustrations of remarkable Secondary Tidal Undulations in January, 1899, as registered on recording Tide Gauges in the region of Nova Scotia. By W. Bell Dawson. (From the *Transactions of the Royal Society of Canada*, Second Series, 1899–1900, vol. v., Section III. Mathematical, Chemical, and Physical Sciences.) Ottawa: J. Hope & Sons, 1899. Size 10 × 7, pp. [4]. *Diagrams.*

Canada—Quebec. *P.I. Civil Engineers* **139** (1900): 286–292. **Pilkington.**
On Methods adopted in carrying out Dock and Harbour Works at Quebec, with description of the Plant employed By Woodford Pilkington. *With Plans.*

Canada—Yukon Territory. *National G. Mag.* **11** (1900): 113–117. **Gorman.**
Ice-Cliffs on White River, Yukon Territory. By Martin W. Gorman.
The occurrence of occasional cliffs of ice on the White river suggests to the author that they are the remains of buried glaciers through which the river has only recently cut its way.

United States. *Miss. Catholiques* **32** (1900): No. 1615. ———
Mission Catholiques aux États-Unis. (*Map.*)
This map shows the Roman Catholic mission districts and stations.

United States. *Petermanns M.* **46** (1900): 73–77. **Preston.**
Geodätische Arbeiten in den Vereinigten Staaten. Von Erasmus D. Preston. *With Map.*

United States—California. **McAdie and Willson.**

The Climate of San Francisco, California. Prepared . . . by Alexander G. McAdie and George H. Willson.—U.S. Department of Agriculture, Weather Bureau. Bulletin No. 28. Washington, 1899. Size 9½ × 6, pp. 30. *Diagrams. Presented by the U.S. Department of Agriculture, Weather Bureau.*

The mean annual temperature for twenty-eight years was 56°·2, the mean for January 50°·1 (the minimum), and the mean for every month from June to October inclusive did not differ by more than one degree from 60°, the maximum being 60°·9 in September. The absolute maximum ever known was 100°, the absolute minimum 29°. The mean annual rainfall is 23 inches, of which only 4 inches fall between April and October inclusive, and about 5 inches each in December and January.

United States—Coast and Geodetic Survey. **Preston.**

Terrestrial Magnetism **5** (1900): 17–28.

The United States Coast and Geodetic Survey: its origin, development, and present status. By E. D. Preston. *With Illustration.*

United States—Coasts. **Carter.**

Coastal Topography of the United States. By Prof. Oscar C. S. Carter. (From *Proceedings of the Engineers' Club of Philadelphia*, vol. xvi., No. 5, October, 1899.) Size 9 × 6½, pp. 273–300. *Illustrations. Presented by the Author.*

United States—Minnesota. ——

The Geological and Natural History Survey of Minnesota. The Twenty-fourth (and final) Annual Report for the Years 1895–1898. Minneapolis, 1899. Size 9½ × 6½. pp. xxviii. and 284. *Presented by the Survey.*

This report completes the work of the Geological Survey of Minnesota, a work on which Prof. Winchell has been engaged since 1872 under many difficulties, and which he now lays down "with thankfulness to all who have aided him and charity for all who have opposed him."

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Quevedo.**

Tesoro de Catamarqueñismos, nombres de Lugar y apellidos Indios con etimologias y eslabones aislados de la lengua Cacana. Por Samuel A. Lafone Quevedo, M.A. Buenos Aires, 1898. Size 10½ × 7, pp. xliv. and 380. *Presented by the Author.*

Argentine Republic. **Quevedo**

Progresos de la Etnologia en el Rio de la Plata durante el Año 1898. Por S. A. Lafone Quevedo, M.A. Buenos Aires, 1899. Size 10½ × 7½, pp. 64. *Maps. Presented by the Author.*

Argentine Republic. **Quevedo.**

El Barco y Santiago del Estero. Estudio histórico topográfico. Por S. A. Lafone Quevedo, M.A. Parts i. and ii. Buenos Aires, 1898. Size 10½ × 7½, pp. (part i.) 36; (part ii.) 36. *Maps. Presented by the Author.*

Argentine Republic—Rosario. **Mallet.**

Trade of Rosario for the year 1899. Foreign Office, Annual No. 2422, 1900. Size 10 × 6, pp. 8. *Price* ½*d.*

Bolivia. ——

Memoria que presenta el Secretario General de Estado a la Convencion Nacional de 1899. Anexos (Tercera Parte) (pp. 372); Ditto Anexos (Cuarta Parte). La Paz. Size 9 × 6.

Particulars as to the various public departments in Bolivia, with voluminous statistics.

Bolivia. **Conway.**

Notes on a Map of part of the Cordillera Real of Bolivia. By Sir Martin Conway. (From the *Geographical Journal* for May, 1900.) Size 10½ × 6½, pp. 2. *Map.*

Brazil. *J. Geology* **8** (1900): 151–153. **Branner.**

Ants as Geologic Agents in the Tropics. By John C. Branner. *With Illustrations.*

On the enormous ant-hills in tropical South America, which not only cover large areas of the country with mounds of clay, but conceal galleries and tunnels penetrating to a great depth even in the hardest soils.

Brazil. *B.S. d'Études Colon.* **7** (1900): 245–271. **Guilmot.**

Céará et Amazonie. Por D. Guilmot. *With Illustrations.*

Brazil—Minas Geraes. **Negri.**

Lo stato di Minas Geraes nel Brasile. Rapporto del nob. cav. E. Negri.—Bollettino del Ministero degli Affari Esteri, Dicembre, 1899. Roma, 1899. Size 9½ × 6½, pp. 24.

On the condition with regard to agriculture and other industry of the state of Minas Geraes, with particulars as to regulations affecting immigration.

Brazil—Rio Grande do Sul. **Lindman.**

Vegetationen i Rio Grande do Sul (Sydbrasilien). Af C. A. M. Lindman. Stockholm: Nordin & Josephson, 1900. Size 10 × 7, pp. x. and 240. *Maps and Illustrations. Price 5 kr. 50 öre. Presented by the Royal Academy of Sciences of Stockholm.*

This volume deals with the varieties of types of vegetation in Rio Grande do Sul; considering not only the species, but their relative abundance, the relation to climate and soil, and the general character and natural divisions of the country.

British Guiana and Venezuela—Boundary. **Brenkelman.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 49–66.

De beslissing in het Britsch Venezuelaansch Grensgeschil. Door Mr. J. B. Brenkelman.

Jamaica. **Roxburgh and Ford.**

The Handbook of Jamaica for 1900: comprising Historical, Statistical, and General Information concerning the Island. Compiled . . . by T. L. Roxburgh and Jos. C. Ford. London: E. Stanford, 1900. Size 9 × 6, pp. viii. and 570. *Map. Price 7s. 6d. Presented by the Publisher.*

Nicaragua Canal. *B.G.S. Philadelphia* **2** (1900): 87–107. **Heilprin.**

The Nicaragua Canal in its Geographical and Geological relations. By Angelo Heilprin. *With Map and Illustrations.*

Peru—The Incas **Quevedo.**

Los Ojos de Imaymana y el Señor de la Ventana. Por S. A. Lafone Quevedo, M.A. Buenos Aires, 1900. Size 10½ × 7½, pp. 32. *Illustrations. Presented by the Author.*

This memoir is founded on Sir Clements Markham's 'Rites and Laws of the Incas,' one chapter of commentary on which is reproduced in English as an appendix.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia.

Australia. Papers relating to the Federation of the Australian Colonies. London: Eyre & Spottiswoode, 1900. Size 13 × 8½, pp. iv. and 32. *Price 3½d.*

Contains the proposed constitution of the Commonwealth of Australia as approved by the governments of New South Wales, Victoria, Queensland, Tasmania, and South Australia.

Australia—Discovery. *B.S.R.G. d'Anvers* **24** (1900): 83–92. **Janssens.**

La participation des Néerlandais à la découverte de l'Australie, 1606–1765. Notes sur l'ouvrage de M. le Professeur J. E. Heeres. Par M. Ed. Janssens.

Caroline Islands. *Deutsches Kolonialblatt* **11** (1900): 100–112. **Bennigsen.**

Bericht des Kaiserlichen Gouverneurs v. Bennigsen über seine Reise zum Zwecke der Uebernahme des Inselgebietes der Karolinen, Palau und Marianen in deutschen Besitz.

Official report of the voyage amongst the Caroline, Palau, and Marianne islands to declare the German domination. See *Journal* for June, p. 648.

German New Guinea. *M. Deutsch. Schutzgeb.* **13** (1900): 75–85. **Schnee.**

Bericht des stellvertretenden Gouverneurs Dr. Schnee über eine Fahrt nach der Südküste Neu-Pommerns. *With Sketch-map.*

Mapia Islands. *Petermanns M.* **46** (1900): 66–69. **Wichmann.**

Die Mapia- oder Bunai-Inseln. Von Prof. Dr. Arthur Wichmann.

This group lies in 1° N., 135° E., and is so little known that the author states that it is not noticed in the English, French, American, or German sailing directions for the Pacific; this, however, is an error, the group being described both in the Admiralty 'Sailing Directions for the Pacific Islands,' and in Findlay's 'North Pacific' under the usual English name of St Davids or Freewill islands.

New South Wales—Trawling.

Australian Museum, Sydney. Memoir IV. Scientific Results of the Trawling Expedition of H.M.C.S. *Thetis*, off the Coast of New South Wales, in February and March, 1898. Part i.—Published 23rd December, 1899. Sydney: Published by order of the Trustees, 1899. Size 10 × 6½, pp. 132. *Chart and Plates. Presented by the Australian Museum.*

Queensland—Thursday Island. **Douglas.**

Past and Present of Thursday Island and Torres Straits. By the Honourable John Douglas, C.M.G. Brisbane: The Outridge Printing Co., 1900. Size 10 × 7½, pp. 16. *Illustrations. Presented by the Author.*

An address to the Thursday islanders given on the occasion of the referendum as to Australian federation, and passing in review the history of the island. The illustrations are excellent reproductions of photographs by the photo-vitrile process.

South Australia. *Mem. R.S. South Australia* **1** (1899): 1–40. **Stirling and Zietz.**

Fossil Remains of Lake Callabonna. Part i. Description of the Manus and Pes of *Diprotodon Australis*, Owen. By E. C. Stirling and A. H. C. Zietz. *With Plates.*

Tonga Islands. *American J. Sci.* **9** (1900): 193–198. **Agassiz.**

Explorations of the *Albatross* in the Pacific. By Alexander Agassiz. III. [Also in *Science* **11** (1900): 288–292.]

Western Australia. *Scottish G. Mag.* **16** (1900): 161–170. **Wittenoom.**

Western Australia in 1899. By the Hon. E. H. Wittenoom.

POLAR REGIONS.

Antarctic. **Markham.**

Die Aufgaben der geplanten Südpolar Expeditionen. Von Sir Clements R. Markham. Vortrag, gehalten am 29 Sept. 1899 vor dem 7 intern. Geogr.-Kongress zu Berlin. Autorisierte freie Uebersetzung von Heinrich Brunner Zurich, 1900. Size 7½ × 5, pp. 16. *Presented by the Translator.*

Translated from the *Geographical Journal* for November, 1899.

Antarctic. *Ymer* **20** (1900): 51–75. **Nordenskjöld.**

Sydpolarforskningens nuvarande ställning och mal. Af Otto Nordenskjöld. *With Chart.*

On the actual state of our knowledge of the antarctic regions, and the aim of future work.

Antarctic—Belgian Expedition. *B.S.R.G. d'Anvers* **24** (1900): 5–51. **Lecointe.**

Expédition Antarctique belge. *With Portraits and Maps.*

An account of the reception of the Bélgian Antarctic Expedition on its return, including the paper describing the expedition read by M. Georges Lecointe, the second in command of the expedition.

Arctic. *B.S.G. Italiana* **1** (1900): 228–242, 339–363, 410–435. **Schoch.**

Una crociera nel Mar Polare Artico. Note prese a bordo della baleniera norvegese "Hertha" dal Giulio Schoch. *With Illustrations.*

A cruise in the early summer of 1899 on the Norwegian whaler *Hertha*, on the edge of the ice between Spitsbergen and Greenland.

Arctic. *B.S.G. Madrid* **42** (1900): 7–36. **Sobral.**

Estudios sobre las Regiones árticas. Por D. José Gutiérrez Sobral. I. De Cabo Norte á Yugor. II. Spitzberg. III. Francisco José y Nueva Zembla.

Franz Josef Land. *M.G. Ges. Wien* **43** (1900): 15–24. **Brosch.**

Prof. Dr. Nansen und Payer's Karte von Franz Josef-Land. Von Gustav Ritter von Brosch. *With Maps.*

Criticism of Dr. Nansen's observations made on his return journey from the farthest north to Franz Josef Land, referring to a recent controversy in the *Nautical Magazine.*

Polar Exploration. *B.S.R. Belge G.* **23** (1899): 345–365, 393–414. **Wauwermans.**

La conquête des Poles. A propos de l'Expédition de Gerlache. Par Lieutenant-General Wauwermans. *With Map.*

This deals with a wide range of subjects, including oceanography in general.

Polar Regions—Whaling. *Ann. Hydrographie* **28** (1900): 120–125. **Hegemann.**

Die gegenwärtige Eismeerfischerei und der Walfang.

MATHEMATICAL GEOGRAPHY.

Cartography. *Riv. G. Italiana* **7** (1900): 177–186. **Fiorini.**
Proiezioni cartografiche cicloidali. Nota di M. Fiorini. Also a separate copy. *Presented by the Author.*

Cartography. *Petermanns M.* **46** (1900): 42–46. **Hammer.**
Unechtcylindrische und unechtkonische flächentreue Abbildungen. Mittel zum Auftragen gegebener Bogenlängen auf gezeichneten Kreisbögen von bekannten Halbmessern. Von Prof. Dr. E. Hammer.

This is referred to in the *Journal* for April, p. 427.

Cartography—Density. *G.Z.* **6** (1900): 220–221. **Henkel.**
Berechnung der Dichte des Eisenbahnnetzes. Von Dr. L. Henkel.

The problem of representing the relative closeness of the network of any lineal distribution (such as length of rivers, railways, or telegraph lines) over a country is solved by taking as unit of comparison, say of railway density, the width of the average mesh which would be formed by ruling a square representing the area of a country into smaller squares, the sum of the lines used in ruling being equivalent to the total length of the railways. Thus the smaller the square representing the mean mesh of the railway net, the denser is that net. The figures obtained for the mean mesh of the railway net in statute miles are Belgium, 8·6; Great Britain, 11·8; German Empire, 15; Switzerland, 16·5; France, 17; United States, 40; India, 102; European Russia, 199.

Cartography—Official Maps. **Farquharson.**
Foreign Topographic Maps. By Colonel Sir John Farquharson, K.C.B. Size 10 × 6½, pp. 14. *Privately printed.*

This is a series of memoranda prepared to accompany a collection of specimens of the official survey maps of all foreign countries with regard to the method and manner of their engraving and printing.

Cartography—Population Maps. *G.Z.* **6** (1900): 185–193. **Hettner.**
Ueber bevölkerungsstatistische Grundkarten. Von Prof. Dr. Alfred Hettner. *With Map.*

A proposal to adopt a system of indicating the number of inhabitants in every inhabited place marked on a map by means of special signs graduated in size or in depth of shading to express the approximate number of inhabitants.

Geodesy. *Deutsche Rundschau G.* **22** (1900): 363–367. **Carlheim-Gyllensköld.**
Die Aufgabe der modernen Geodäsie. Von V. Carlheim-Gyllensköld.

Geodesy. *Science* **11** (1900): 369–374. **Hayford.**
Recent Progress in Geodesy. By Dr. J. F. Hayford.

Geodesy—Levelling. **Zachariæ.**
Oversigt K. Danske Vidensk. Selsk. Forhand. (1899): 491–544.
Præcisionsnivellementet over Øresund. Af General-major G. Zachariæ. (With *Résumé* in French.]

On the method employed and the results obtained in levelling operations along three lines across the Sound, in order to connect the levels of Sweden with those of Denmark independently of the level of the intervening sea.

Measurement of Map Areas. *G.Z.* **6** (1900): 139–148. **Hammer.**
Die Genauigkeit der Flächenangaben in der Geographie. Ein Vorschlag. Von Prof. Dr. E. Hammer.

On the degree of precision to be obtained in measuring areas on maps, as the result of which the author finds that decimals are valueless for any area over 500 square kilometres; that no area between 1000 and 20,000 can be exact to a closer degree than from one to ten units; and that areas over 500,000 are of no significance save with rounded hundreds; while over 2,000,000 square kilometres they can only be trusted to round thousands.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Astronomy—Nebular Hypothesis. *J. Geology* **8** (1900): 58–73. **Chamberlin.**
An attempt to test the Nebular Hypothesis by the relations of masses and momenta. By T. C. Chamberlin.

The result of this discussion is to show relationships of mass and momentum, which are apparently incompatible with the evolution of the solar system from a gaseous spheroid controlled by the laws of hydrodynamic equilibrium.

Atmospheric Circulation. *Sitzb. A.W. Berlin* (20) (1900): 356–372. **Bezold.**

Zur Thermodynamik der Atmosphaere. Von Wilhelm von Bezold. V. Die klimatologische Bedeutung der Lehre von der auf- und ab-steigenden Luftströmen.

Geology. *Science* **11** (1900): 561–574. **Osborn.**

The Geological and Faunal relations of Europe and America during the Tertiary Period, and the theory of the successive invasions of an African Fauna. By Prof. H. F. Osborn. *With Charts.*

Geomorphology. *C. Rd.* **130** (1900): 449–464. **Bertrand.**

Déformation tétraédrique de la Terre et déplacement du pôle. Note de M. Marcel Bertrand. *With Diagrams.*

This important memoir will be summarized in the *Journal*.

Geomorphology. **Lapparent.**

Sur la symétrie tétraédrique du globe terrestre. Par M. de Lapparent. (Extrait des *Comptes rendus des Séances de l'Académie des Sciences*, t. cxxx., séance du 5 mars 1900.) Size 11 × 9, pp. 6. *Presented by the Author.*

In this paper M. de Lapparent calls attention to the theory of Mr. Lowthian Green as to the tetrahedral symmetry of the Earth.

Geomorphology. **Suess.**

La Face de la Terre (Das Antlitz der Erde). Par Ed. Suess. Traduit . . . et annoté sous la direction de Emmanuel de Margerie. Tome ii. Paris: A. Colin et C^ie^, 1900. Size 10 × 6½, pp. 878. *Maps and Illustrations. Presented by the Publishers.*

This is the translation of the second volume of Suess's great work, the first having been noted in the *Journal*, vol. xi. (1898), p. 440. The second volume, which deals with the ocean basins, was published in 1888, and the translators have brought the matter down to date by including a great number of notes to recent literature. The original illustrative diagrams have been reinforced by twice as many, now added for the first time. The want of an index is a serious drawback, but the provision of an adequate index to such a book would be a very serious labour.

Oceanography. *Öfversigt K. Vet. A. Förhand. Stockholm* **56** (1899): 857–872. **Cleve.**

On the origin of "Gulf Stream water." By P. T. Cleve.

The method of study is by the observation of the plankton contained in the water, and these have convinced Mr. Cleve that the "Gulf Stream water" (as water of about 3·50 per cent. salinity in the North Atlantic is usually called) comes into the North Atlantic along the west coast of Africa and between the Azores and Europe as an under-current.

Oceanography. *Öfversigt K. Vet. A Förhand. Stockholm* **56** (1899): 785–808. **Cleve.**

On the Seasonal Distribution of some Atlantic Plankton-organisms. By P. T. Cleve.

Oceanography. **Dickson.**

The Mean Temperature of the Surface Waters of the Sea round the British Coasts, and its relation to the mean temperature of the air. By H. N. Dickson. (From the *Quarterly Journal of the Royal Meteorological Society*, vol. xxv., No. 112, October, 1899, pp. 277–302.) Size 10 × 6½. *Presented by the Author.*

Oceanography. *Öfversigt K. Vet. A. Förhand. Stockholm* **56** (1899): 141–166. **Pettersson.**

Ueber den Einfluss der Eisschmelzung auf die Oceanische Cirkulation. Von O. Pettersson. *With Charts, etc.*

On the influence of the melting of sea-ice on oceanic circulation.

Oceanography. *Ann. Hydrographie* **28** (1900): 74–75. **Witte.**

Das kalte Küstenwasser. Von E. Witte.

Herr Witte claims priority for the discovery in 1870 that the cold water found near coasts was due to up-welling from a great depth, and he recalls attention to the three agencies which he believes to be concerned in producing the up-welling, viz. (1) the deviation of currents by the Earth's rotation causing a reduction of pressure on the convex side of the curve, (2) the action of off-shore winds, and (3) centrifugal force. The second cause is that usually recognized as of the greatest, if not the sole, importance.

Oceanography. *Tijds. K. Ned. Aard. Genoots. Amsterdam* **17** (1900): 115–118. ——

On the work of the *Siboga* expedition in the seas of the Malay archipelago in September and October, 1899.

Oceanography. **Hjort, Nordgaard, and Gran.**

Bergens Museum. Report on Norwegian Marine Investigations, 1895-97. By Dr. Johan Hjort, O. Nordgaard, and H. H. Gran. Bergen: J. Grieg, 1899. Size 15 × 11, pp. 22, 20, and 30. *Maps and Plates. Presented by D. M. M. Crichton Somerville, Esq.*

Oceanography—Museum. *Rev. Scientifique* **13** (1900): 528–530. **Richard.**

Le Muséum océanographique de Monaco. Par M. Jules Richard. *With Illustrations.*

Describes and illustrates the museum founded by the Prince of Monaco and opened last year for the purpose of bringing together all objects of interest relating to oceanography.

Rivers. *G.Z.* **5** (1899): 434–456; **6** (1900): 97–104, 148–170. **Ule.**

Die Gewässerkunde im letzten Jahrzehnt. Von Willi Ule.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. *B.S. Neuchatel. G.* **12** (1900): 219–260. **Brunhes.**

L'Homme et la Terre cultivée. Bilan d'un siècle. Par Jean Brunhes, professeur de géographie, à l'Univérsité de Fribourg.

This is an extract from a monumental work to be published in Paris by MM. Goupil, which will summarize the progress made during the nineteenth century in all sciences. The present article considers the relations between the human race and the vegetation of the Earth, both with respect to the problem of developing the land, and to the history of the introduction of new cultures.

Anthropogeography. *Scottish G. Mag.* **16** (1900): 121–138. **Mill.**

The Development of Habitable Lands. An essay in Anthropogeography. By Hugh Robert Mill, D.SC.

Anthropogeography—Census. *J.R. Statistical S.* **63** (1900): 41–71. **Baines.**

On Census-taking and its Limitations. By J. A. Baines.

Commercial Geography—Cables. *Rev. Française* **25** (1900): 153–160. **Demanche.**

Les projets de Cables. Par M. G. Demanche. *With Map.*

The map shows the existing British and French submarine cables, and those which are projected. The projects treated as most urgent is the construction of a French cable along the West African coast to St. Louis, and from Kotonou to Libreville, also cables from Tamatave to Reunion, and from Hue to Amoy.

Commercial Geography—Silk. *Ann. G.* **9** (1900): 97–118. **Groffier.**

La production de la soie dans le monde. Par M. V. Groffier. *With Map.*

Historical—Cabot. **Quevedo.**

El "Sebastian Gaboto" de Henry Harrisse. Por S. A. Lafone Quevedo, M.A. 1st and 2nd parts. Buenos Aires, 1898-99. Size 10½ × 7½, pp. (part i.) 34; (part ii.) 62. *Facsimile Maps. Presented by the Author.*

Historical—Discovery of America. *Deutsche Rundschau G.* **22** (1900): 289–295. **Stock.**

Zum neunhundertjährigen Jubiläum der ersten Entdeckung Amerikas (a. 1000 n. Chr.). Von Franz Stock.

Historical—Ebstorf Map. **Miller.**

Die Ebstorfkarte, eine Weltkarte aus dem 13 Jahrhundert. Herausgegeben und erläutert von Dr. Konrad Miller. Dritte Auflage. Stuttgart und Wien: J. Roth, 1900. Size 9½ × 6½, pp. 128. *Price* 1.50*m.*

Historical—Geographical Society. *B.S.G. Marseille* **23** (1899): 365–375. **Fournier.**

Une Société de Géographie à Marseille en 1801. Par M. Joseph Fournier.

The French "Société de l'Afrique intérieure" was founded in Paris shortly after the Revolution, on the model of the African Association of London, and removed to Marseilles in 1801.

Historical—Identification. *G.Z.* **6** (1900): 194–199. **Ruge.**

Ueber Identifizierung antiker Oertlichkeiten. Von W. Ruge.

On the method of identifying ancient sites from the names or descriptions given in old works.

Historical—Maps. *Ymer* **20** (1900): 15–23. **Nordenskiöld.**

Randteckningar i gamla handskrifter af Datis La Sfera. Af A. E. Nordenskiöld. *With Facsimile Maps.*

On the marginal drawings on the ancient manuscripts of Dati's fifteenth-century map entitled 'La Sfera.'

Town Plans. *Z. Ges. Erdk. Berlin* **34** (1899): 446–462. **Schlüter.**

Ueber den Grundriss der Städte. Von Dr. Otto Schlüter. *With Plate.*

A study of the ground plan of towns, with reference to the cause of their origin and the manner of their growth.

BIOGRAPHY.

Biographical Dictionary. **Lee.**

Dictionary of National Biography. Edited by Sidney Lee. Vols. lix–lxii. London: Smith, Elder & Co., 1899–1900. Size 10 × 6½, pp. (vol. lix.) vi. and 460; (vol. lx.) vi. and 470; (vol. lxi.) vi. and 476; (vol. lxii.) vi. and 452. *Price (each vol.)* 15*s.*

The following names of geographical interest appear among the notices in these volumes:—Vol. lix., Sir Charles Pyndar Beauchamp Walker, by Colonel E. M. Lloyd; General James Thomas Walker, by Colonel R. H. Vetch; Horace Waller, by G. C. Boase; John Wallis, by E. Irving Carlyle; Samuel Wallis, by Prof. J. K. Laughton; Rev. Richard Walter, by the same; Peter Egerton Warburton, by C. Alexander Harris; James Clifton Ward, by Rev. Prof. T. G. Bonney; John Ward, by Prof. J. K. Laughton; Rear-Admiral John Washington, by E. C. Marchant. Vol. lx., Major-General Sir Andrew Scott Waugh, by Colonel R. H. Vetch; James Weddell, by Prof. J. K. Laughton; Isaac Weld, by T. Seccombe; Edward Wells, by Thompson Cooper; James Raymond Wellsted, by Prof. J. K. Laughton; George Weymouth, by the same; Sir George Wheler, by Warwick Wroth. Vol. lxi., Sir Richard Whitbourne, by E. Irving Carlyle; John White, by T. Seccombe; Samuel Edward Widdrington, by E. Irving Carlyle; Sir John Gardner Wilkinson, by Rev. Prof. D. S. Margoliouth. Vol. lxii., Bishop Willibald, by Miss A. M. Cooke; William John Wills, by C. A. Harris; Andrew Wilson, by G. Le Grys Norgate; William Rae Wilson, by T. Bayne; John Windus, by T. Seccombe.

Camperio. *Deutsche Rundschau G.* **22** (1900): 375–378. **Stettner.**

Manfredo Camperio. *With Portrait.*

Born 1826, died 1899, the subject of this notice was indefatigable in promoting the cause of geography in Italy.

Crepy. ——

Société de Géographie de Lille. Séance Solennelle du Dimanche 21 Janvier 1900. [Vingt ans de présidence de M. Paul Crepy.] Extrait du Bulletin de Février 1900. Lille, 1900. Size 10 × 6½, pp. 16. *Portrait. Presented by the Société de Géographie of Lille.*

François. *Deutsche Rundschau G.* **22** (1900): 374–375. ——

Curt v. François. *With Portrait.*

General. **Wolkenhauer.**

Geographische Nekrologie für die Jahre 1898 und 1899. Von Prof. Dr. W. Wolkenhauer. Size 8½ × 5½, pp. [20]. *Presented by the Author.*

Hasse. *Deutsche Rundschau G.* **22** (1900): 324–326. ——

Dr. Ernst Hasse. *With Portrait.*

Mahé de La Bourdonnais. **Leblond.**

Rev. G. **45** (1899): 64, 142, 217, 279, 366, 446; **46** (1900): 56.

Mahé de La Bourdonnais. Par M. M.-A. Leblond.

Marcet. *Nature* **61** (1900): 497. **Tunnicliffe.**

Dr. William Marcet, F.R.S. By Dr. F. W. Tunnicliffe.

Dr. Marcet was well-known as a meteorologist.

Meyer. *Deutsche Rundschau G.* **22** (1900): 276–278. ——

Dr. Hermann Meyer. *With Portrait.*

Proskowetz.

Max von Proskowetz, mit einem Epilog. Felix von Proskowetz. [Wien: J. N. Vernay, 1899.] Size 10½ × 7½, pp. 112. *Portrait. Presented by the Author.*

Max von Proskowetz (1851–1898) was in the German consular service, and a voluminous writer on geographical, economic, and other subjects. A list of his writings is given in an appendix.

Symons. *Symons's Monthly Meteorolog. Mag.* **35** (1900): 17–18. **Wallis.**

George James Symons, F.R.S. By H. Sowerby Wallis. [*See also J.S. Arts* **48** (1900), 367.]

Mr. Symons was eminent as a meteorologist, and the particular object of his studies was the rainfall of the British Islands. He initiated a voluntary system of rainfall stations, and developed it until it included over 3000 observers. He was born August 6, 1838, and died March 10, 1900.

Tillo. *Terrestrial Magnetism* **5** (1900): 8.

Lieutenant-General Alexis de Tillo. *With Portrait.*

Tillo. *Petermanns M.* **46** (1900): 41–42. **Woeikow.**

Alexis v. Tillo. Von Prof. Dr. A. Woeikow.

Vespucci. *Riv. G. Italiana* **7** (1900): 109–114. **Harrisse.**

Per Amerigo Vespucci. Una lettera di Henry Harrisse.

Zeller-Horner. **Walder.**

LXIII. Neujahrsblatt zum Besten des Waisenhauses in Zürich für 1900. Heinrich Zeller-Horner als Erforscher und Darsteller der Schweizer Gebirgswelt. Von Prof. Dr. E. Walder. Zürich, 1900. Size 11 × 9, pp. 44. *Panorama. Presented by H. Brunner, Secretary of the Stadtbibliothek, Zurich.*

Biography of a Swiss artist (born 1810, died 1897), whose special study was mountain-scenery.

GENERAL.

Big Game. **Scheibler.**

Felice Scheibler. Sette Anni di Caccia Grossa e Note di Viaggio in America, Asia, Africa, Europa. Milano: Ulrico Hoepli, 1900. Size 10 × 7, pp. xvi. and 526. *Illustrations. Price, Lire* 14. *Presented by the Publisher.*

A profusely illustrated record of big-game shooting during seven years' wanderings in the Rocky mountains, India, Ceylon, Somaliland, Equatorial Africa, and Russia.

British Colonies.

Statistical Tables relating to the Colonial and other Possessions of the United Kingdom. Part xxii. 1894–95–96. London: Eyre & Spottiswoode, 1900. Size 13½ × 8½, pp. x. and 866. *Price* 6*s.* 10½*d.*

The statistics contained in these tables are of the most comprehensive character.

California University.

The International Competition for the Phœbe Hearst Architectural Plan for the University of California. [San Francisco, 1899.] Size 10½ × 13½, pp. 152. *Illustrations. Presented by the University of California.*

This book is printed in parallel columns in English, French, Italian, and German. Excellent as the plans of the successful competitor are, they are defective in making no provision for the study or teaching of geography.

Catalogue of MS.

Ministère de la Guerre. Inventaire Sommaire des Archives historiques. (Archives Anciennes. Correspondance.) Tome Premier. Fasc. i. and ii. Paris: Imprimerie Nationale, 1898–99. Size 10 × 6½, pp. viii. and 472. *Presented by the French Minister for War.*

Catalogue of 1615 numbered series of MS. documents, dating from the middle of the sixteenth century to 1792, and referring mainly to military operations.

Educational—Methods. *B.S. Neuchatel G.* **12** (1900): 5–36. **Girard.**

Sur l'enseignement de la géographie dans les collèges. Par Raymond de Girard.

An interesting lecture, full of examples of the improper teaching of geography, and urging the study of the subject in a systematic and intelligent manner.

Educational—Textbook. **Reusch.**

Geografi for Middelskolen. Af Dr. Hans Reusch. Kristiania: T. O. Brøgger, 1900. Size 9½ × 6½, pp. 182. *Illustrations. Presented by the Author.*

A well-planned and illustrated school-book.

Game destruction. *Quarterly Rev.* **191** (1900): 299–316.

An Age of Extermination.

Geographical Congress. *B.S.R. Belge G.* **23** (1899): 415–423. **Leclercq.**

Le VII^me^ Congrès International de Géographie à Berlin. Par M. Jules Leclercq.

Medical Geography—Malaria. *B.S. d'Etudes Colon.* **7** (1900): 101–112. **Broden.**

La Malaria d'après les dernières recherches des Italiens. Par le Dr. A. Broden.

Medical Geography—Plague. *National G. Mag.* **11** (1900): 97–113. **Sternberg.**

The History and Geographic Distribution of Bubonic Plague. By George M. Sternberg, LL.D.

Place Names. *J.S. Arts* **48** (1900): 365–367. **Birdwood.**

Etymology of Africa and Ophir. By Sir George Birdwood.

Sir George Birdwood shows that Dr. Carl Peters' theory that "Africa" was derived from "Ophir" is historically and etymologically untenable, the name being derived from the Phœnician *Afrykah*, meaning "the colony."

Year-Book. **Keltie and Renwick.**

The Statesman's Year-Book. Statistical and Historical Annual of the States of the World for the year 1900. Edited by J. Scott Keltie, LL.D., with the assistance of I. P. A. Renwick. London: Macmillan & Co., 1900. Size 7½ × 5, pp. xxxvi. and 1280. *Maps. Price* 10*s.* 6*d. Presented by Dr. J. Scott Keltie.*

In addition to the usual thorough revision, this issue of the 'Statesman's Year-Book' contains a series of valuable statistical tables of the production of various commodities, and a series of valuable maps showing the reorganization and rectification of boundaries in North-East Africa, Nigeria, and French West Africa, Pacific Islands, and British Guiana.

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Murray's Handy Classical Maps. Edited by G. B. Grundy, M.A. Italia and Sicilia. Scale 1 : 1,200,000 or 18·9 stat. miles to an inch. *Price* 1*s.* 6*d.* Hispania. Scale 1 : 2,500,000 or 39·4 stat. miles to an inch. *Price* 1*s.* London: J. Murray, 1900. *Presented by the Publisher.*

Murray's series of Handy Classical Maps, to which these belong, will no doubt be very useful for educational purposes. The maps are prepared under the superintendence of Mr. G. B. Grundy, M.A., of Brasenose College, Oxford, and show the physical features by a system of hachuring and colouring.

Each map is complete in itself, and is bound up in a separate cover, with an index.

England and Wales. **Bartholomew.**

Bartholomew's Reduced Ordnance Survey of England and Wales. Scale 1 : 126,620 or 2 stat. miles to an inch. Sheet 5: North Lancashire. J. Bartholomew & Co., Edinburgh, 1900. *Price* 2*s. mounted on cloth. Presented by the Publishers.*

This sheet includes the country in the neighbourhood of Morecambe bay, extending from Preston on the south to Kendal on the north, and from the coast on the west to Blackburn on the east. The Isle of Man is given, on the same scale, as an inset. As in other sheets of this series, the relief of the country is well brought out by contours and colouring, and the driving and cycling roads are shown in red. The map is well suited to meet the requirements of the tourist.

England and Wales. **Ordnance Survey.**

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6-inch—County Maps:—

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Europe. **Hergesell.**

Luftdruck und Temperatur-Verteilung über Europa in verschiedenen Höhen am 24ten Marz, 1899. Von Prof. Dr. H. Hergesell. *Petermanns Geographische Mitteilungen,* Jahrgang 1900. Maps. 8, 9. Justus Perthes, Gotha, 1900. *Presented by the Publisher.*

The first of these two sheets shows the distribution of the atmospheric pressure and temperature over Europe on March 24, 1899, at sea-level, and at altitudes of 5000 and 10,000 metres. The second illustrates, by a series of eight diagrams, the daily range of temperature at different altitudes and seasons of the year. The first three of these diagrams show the mean annual daily range at sea-level and on the spire of Strassburg cathedral, and the daily range for winter and summer as observed at sea-level and the top of the Eiffel Tower. These charts accompany an interesting paper by Prof. H. Hergesell in *Petermanns Mitteilungen* for May, 1900.

France. **Johnston.**

Plans of Paris and the Exhibition, with Map of France. W. & A. K. Johnston, Edinburgh and London. *Price* 1*s. coloured. Presented by the Publishers.*

A general map of France and plans of Paris and the Exhibition Buildings are given on this sheet, which will doubtless be useful to tourists.

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Herausgegeben von der Kartogr. Abtheilung der Konigl. Preuss. Landes-Aufnahme, 1899. Sheets: 287, Lehrte; 305, Ahaus; 307, Iburg; 309, Lemgo; 310, Hameln; 329, Koesfeld; 332, Gütersloh; 356, Soest.

Germany. **Langhans.**

Die wirtschaftlichen Beziehungen der deutschen Küsten zum Meere. Scale 1 : 1,500,000 or 23·7 stat. miles to an inch. Paul Langhans. *Petermanns Geographische Mitteilungen,* Jahrgang 1900, Tafel 10. Justus Perthes, Gotha, 1900. *Presented by the Publisher.*

Italy. **Istituto Geografico Militare.**

Carte d'Italia. Scales 1 : 25,000 and 1 : 50,000. Istituto Geografico Militare, Firenze. *Price* 50 *centesimi each sheet.*

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Portugal. **Delgado and Choffat.**

Carta Geologica de Portugal. Por J. F. N. Delgado e Paul Choffat. Scale 1: 500,000 or 7·8 stat. miles to an inch. Direcção dos Trabalhos Geologicos, Lisbon, 1899. 2 sheets. *Presented by the Direcçao dos Trabalhos Geologicos.*

The Portuguese Government survey map on the scale of 1: 100,000 forms the geographical basis of this geological map of Portugal. The geological features are shown by a system of well chosen colours, in addition to which numerous heights are given in figures. Great care has evidently been taken with the printing.

Turkey. **Turkish General Staff.**

Map of European Turkey. Scale 1: 216,000 or 3·4 stat. miles to an inch. Turkish General Staff, Constantinople, 1899. 12 sheets. In Turkish character.

ASIA.

Asia. **Service Géographique de l'Armée, Paris.**

Asie. Scale 1: 1,000,000 or 15·8 stat. miles to an inch. Sheet: Iles Riou-Kiou. Service Géographique de l'Armée, Paris. *Price* 1·25 *fr.*

Another of the sheets of Eastern Asia on the 1: 1,000,000 scale, now being published by the Service Géographique de l'Armée, Paris.

AFRICA.

Egypt. **Survey Department, Public Works Ministry.**

General Map of Egypt. Sheet D 4, Kharga Oasis. Scale 1: 500,000 or 7·8 stat. miles to an inch. Survey Department, Public Works Ministry, 1900. *Presented by Captain H. G. Lyons, R.E.*

This sheet is an indication of the excellent work now being performed by the Egyptian Survey Department, under the superintendence of Captain H. C. Lyons, R.E. It forms part of general map, which is to embrace a wide area, and includes the Kharga oasis situated to the west of the Nile about 120 miles to the south of Siut. Hills are shown by brown shading, and the lettering and routes are in black. Heights are given in metres.

Madagascar. **Locamus.**

Carte de Madagascar. Scale 1: 500,000 or 7·8 stat. miles to an inch. Par P. Locamus. Sheets: 1, Iles Comores; 3, Majunga; 4, Maroantsetra. Paris: Maison Andriveau-Goujon. H. Barrére.

These are three sheets of the map of Madagascar, which was noticed in the *Geographical Journal* of last month.

Orange Free State. **Johnston.**

War Map of the Orange Free State. Scale 1: 1,000,000 or 15·8 stat. miles to an inch. W. & A. K. Johnston, Edinburgh and London, 1900. *Price* 6*d. coloured. Presented by the Publishers.*

AMERICA.

North America. **Geological Survey of Canada.**

Relief Map of Canada and the United States. Scale 1 : 15,206,400 or 240 stat. miles to an inch. Geological Survey of Canada, Ottawa, 1900. *Presented by the Geological Survey of Canada.*

In this map land from sea-level to 100 feet is left white, and then four tints of brown, which increase in intensity with the altitude, show the altitudes from 100 to 1000 feet, 1000 to 5000 feet, 5000 to 10,000 feet, and above 10,000 feet. Only the more important names are given, and the map is clearly printed, but would, however, have been much more valuable to the student of physical geography if more contours on the land had been given, and if they had been continued so as to show the depths of the surrounding oceans and seas. The latest government surveys of Canada and the United States serve as the data upon which the map is based.

EASTERN ARCHIPELAGO.

Batavia. **Netherlands Government.**

Topographische Kaart der Residentie Batavia. Scale 1 : 100,000 or 1·6 stat. mile to an inch. 1882-83. New Edition, 1887.

In this edition railways have been added, and the map has been in other respects brought up to the date of publication. The map is printed in colours to show physical features, land under cultivation, etc., but in the mountainous regions the colouring is somewhat too dark.

East Indies. **Netherlands Government.**

Atlas der Nederlandsche Bezittingen in Oost-Indië, naar de nieuwste bronnen, samengesteld en aan de regeering opgedragen door J. W. Stemfoort en J.J. ten Siethoff. Gereproduceerd, op last van het Department van Koloniën.

The first edition of this atlas of the Dutch East Indies was completed in 1885, since which date much fresh information has been obtained concerning many of the islands, and a new edition was greatly needed. This has now been undertaken by the Netherlands Colonial Department, and five sheets have already appeared, which are as follows: Sheet No. 11, Banka island, 1: 500,000; Billiton island, 1 : 400,000; Rio and the Lingen archipelago, 1 : 750,000. No. 12, Western Division of Borneo, 1: 1,000,000. No. 13, South and East Division of Borneo, 1 : 1,500,000. No. 15, the Lesser Sunda islands. No. 16, the Molucca Islands, 1 : 3,000,000. Ceram, Buru, and adjacent islands, 1 : 1,000,000. Dutch New Guinea, 1 : 4,000,000; and Banda islands, 1 : 78,000.

GENERAL.

French Colonies. **Pelet.**

Atlas des Colonies Françaises. Dressé par ordre du Ministère des Colonies par Paul Pelet. Paris: Armand Colin & Cie. Livraison I. *Price* 3 *fr.*

This is the first part of an atlas of the French colonies now in progress of publication. The maps, which are compiled from official sources, include the results of recent explorations and researches, whilst the scales employed are sufficiently large to admit of a fair amount of detail being shown. Map No. 7 on the scale of 1 : 2,500,000 is especially interesting just at the present time, and includes the Algerian Sahara and the southern part of the Tunis. In the north-west corner a small part of Morocco is shown, but no attempt has been made to indicate the boundary between that country and Algeria. Routes are given in red, together with the travellers' names and the dates of the journeys. No. 22 is a general map of Tonkin, on the scale of 1 : 500,000, and includes the country of the Songkoi (Red river) delta. No. 25, New Caledonia and its dependencies, is on several scales, ranging from 1 : 1,000,000 to 1 : 10,000,000. The principal map, which is of New Caledonia itself, is on the 1 : 1,000,000 scale. When complete the atlas will consist of twenty-seven maps, printed in colours, besides numerous insets, and will be published in nine parts, each of which will cost three francs, and will contain three maps and descriptive letterpress.

World. **Blundau.**

A. Blundau, Erdumrisskarte in flächentreuer Planisphäre. Central scale 1 : 30,000,000 or 473 stat. miles to an inch. Geographischer Verlag von Carl Chun, Inh. Bernh. Fahrig, Berlin. *Price* 1.40 *mark.*

This is an outline map of the world published for educational purposes and the use of geographical students, on an elliptical projection, and measuring about 25 by 48 inches. There is no doubt that, whilst Mercator's projection is unequalled for the purposes of navigation, inasmuch as all bearings can be laid down upon it as straight

lines, there are times when its enormous exaggeration in the size of areas in the regions of high latitudes, as compared with those within the tropics, is a serious drawback; not merely that the inexperienced eye fails to make proper allowance for this exaggeration, and so is misled as to relative proportions, but that, in order to construct a map of the world on Mercator's projection of which the tropical regions shall be on a really useful scale, owing to the increase of the degrees of latitude towards the poles, the map often becomes unnecessarily large for the purposes of the student, and difficult to place on the table. These considerations have led the author to draw this outline-map of the world on the elliptical projection, of which there are several forms; but that which he has adopted, based upon Lambert's True Plane Azimuthal Projection, is perhaps better than many, although the distortion in the form of the land areas towards the eastern and western limits of the map is very apparent. The map is merely an outline, and, in addition to the coast-line, shows only the principal rivers. No names are given, nor are the positions of the cities and most important towns indicated, which is a mistake, as these would often serve as a valuable guide, and it would certainly have been better if the outline had been more carefully drawn in some parts. However, the map will be useful to students and others for the purpose of exhibiting physical features, distribution of animal life, rainfall, and similar phenomena, which can be laid down upon it.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, March and April, 1900. *Presented by the Hydrographic Department, Admiralty.*

114D m = 4·0 River Forth:—Carron river to Stirling. 2*s.* 6*d.*

3038 m = 1·0 Norway, west coast:—Biörnsund to Kristiansund. 2*s.* 6*d.*

No.	Inches.	
1647 m =	1·0 12·0	Plans in the Grecian archipelago:—Erissos and Problaka bays, Plati harbour (reproduction). 1*s.*
1692 m =	7·2 5·2 0·7	Anchorages on the coast of Morocco:—Zafarin islands, Melilla, Alhucemas bay (reproduction) 1*s.* 6*d.*
1149 m =	5·8	Plans on the west coast of Iceland:—Hvammsvig. 1*s.*
3091 m =	2·9	Newfoundland:—Little bay island to League rocks. 2*s.* 6*d.*
3117 m =	1·2	Lake Ontario:—Western part of the bay of Quinte, Desoronto to Presqu' île. 2*s.* 6*d.*
2866 m =	1·8 7·0	United States, east coast:—Winyah bay and Georgetown harbour. 1*s.* 6*d.*
1148 m =	3·6	Puerto Rico: Ponce harbour, Muertos island. 1*s.* 6*d.*
3106 m =	2·0 3·8	Mexico:—San José del Cabo bay, San Lucas bay. 1*s.* 6*d.*
3122 m =	0·36	United States, west coast:—Redding rock to Cape Blanco. 2*s.* 6*d.*
3123 m =	0·36	United States, west coast:—Cape Blanco to Yaquina river. 2*s.* 6*d.*
3124 m =	0·36	United States, west coast:—Yaquina river to Cape Disappointment 2*s.* 6*d.*
1911 m =	0·29	North America, west coast:—Approach to Juan de Fuca strait. (Plans:—Port San Juan, Neéah bay (reproduction). 2*s.* 6*d.*
2078 m =	9·5	British Columbia:—Harbours and anchorages in the strait of Georgia; Sturt bay and Van Auda cove. 1*s.*
3048 m =	7·8	Mauritius:—Grand port, southern entrance and central anchorages. 2*s.* 6*d.*
1156 m =	3·9	Plans on the north-east coast of China:—Cochran landing. 1*s.*
3025 m =	5·9	China, north coast:—Wei Hai wei anchorage. 2*s.* 6*d.*
1648 m =	0·14	Japan:—Van Diemen strait to Oö Sima. 2*s.* 6*d.*
3099 m =	0·98	Tonga islands:—Haapai group, northern portion. 2*s.* 6*d.*
3100 m =	0·98	Tonga islands:—Haapai group, southern portion. 2*s.* 6*d.*
3098 m =	0·95	Tonga islands:—Vavau group. 2*s.* 6*d.*
1141 m =	1·0 0·5	Islands in the North Pacific:—Laysan island. French Frigate shoal. 1*s.* 6*d.*
300		Anchorages on the west and north coasts of Spitzbergen:—Plans added, Beverly sound, South haven, Bear island.
610		Gambia river:—Plan added, Anchorage off MacCarthy's island.
403		Australia, south coast, Wood point to Lowly point:—Plan added, Port Pirie harbour.
134		Anchorages in the New Hebrides:—New plan, Port Narevin.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.	Cancelled by	No.
1679 Plan of Erissos and Problaka bays on this sheet.	New plan. Erissos and Problaka bays	1647
1692 Anchorages on the coast of Morocco.	New plan. Anchorages on the coast of Morocco	1692
2866 Winyah bay and Georgetown harbour.	New plan. Winyah bay and Georgetown harbour	2866
479 Plan of Port Ponce on this sheet.	New Plan. Ponce harbour	1148
1930 Plans of San José del Cabo bay, and San Lucas bay on this sheet.	New sheet. San José del Cabo bay, San Lucas bay	3106
1911 Juan de Fuca strait.	New chart. Juan de Fuca strait	1911
2357 Vavu group.	New chart. Vavu group	3098

Charts that have received Important Corrections.

No. A–P, Index charts, sixteen sheets. 2010, England, west coast:—Morecambe bay. 262B, 2370, Germany, north coast:—Brüster-ort to Memel. 2646, France, west coast:—Bourgneuf to Ile de Groix. 177, Mediterranean:—The Faro, or strait of Messina. 189, Sicily:—Trapani to Marsala. 2701, Adriatic:—Gulf of Cattaro to Corfu. 2207, Black sea:—Danube river mouths. 2233, Black sea:—Sevastopol to Kertch strait. 1074, Bermuda:—Approach to Grassy bay. 1614, Falkland islands:—Stanley harbour. 2012, Central America:—San Juan del Norte. 1303, Chile:—Approaches to Lota and Coronel. 2323, Mexico, west coast:—Manzanilla bay to the gulf of California. 2324, Mexico, west coast:—Cape San Lucas to San Diego bay. 579, British Columbia:—Strait of Georgia, sheet I. 2458, Alaska:—Port Simpson to port McArthur. 2463, Alaska:—Port McArthur to Windham bay. 2337, Alaska:—Sitka sound. 1499, Alaska:—Cross sound to Kadiak island. 2172, Bering strait. 40, India, west coast:—Karáchi harbour. 830, Bay of Bengal:—Bassein river to Pulo Penang. 825, Andaman islands. 3103, Andaman islands:—North part of North Andaman island. 2760, Sumatra, west coast:—Acheh head to Tyingkok bay. 942A, Eastern Archipelago, eastern portion. 2391, Ports in the Philippine islands. 1459, China:—Hong Kong harbour. 1199, China:—Kue shan islands to the Yang tse Kiang. 1124, China:—Southern approach to the Yang tse Kiang. 2657, Japan:—Gulf of Tokyo. 128, Japan:—Channels between Bingo Nada and Ozuchi sima. 1058, Australia, west coast:—Rottnest island to Warnbro' sound. 1700, Australia, west coast:—Freemantle harbour and Gage roads. 363, Australia, east coast:—Keppel bay and islands. 2921, Australia, east coast:—Claremont point to Cape Direction. 2123, New Guinea:—Orangerie bay to Bramble haven. 2460, Pacific ocean:—Kamchatka to Kadiak island. 480, New Caledonia:—Port Nouméa.
(*J. D. Potter, Agent.*)

United States Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic and North Pacific Oceans for May, 1900. Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Canada. **Hanbury.**

Ninety-three Photographs of the North-West Territories of Canada, by D. T. Hanbury, Esq. 1899. *Presented by D. T. Hanbury, Esq.*

Mr. Hanbury's travels in the North-West Territories of Canada in the summer of 1899 extended over a considerable area from Lake Winnipeg to Oxford House, Fort Churchill, Chesterfield inlet, and to the Clinton Golden lake and the Great Slave lake on the west. He succeeded in taking some excellent little photographs, copies of which he has presented to the Map-room. Some of these are very interesting, especially those of Esquimaux and Indians. The following is a list of their titles:—

(1) Hudson Bay Company's boat: trading with Esquimaux; (2) Kyaks tied together for carrying baggage; (3) Esquimaux dogs and cariole; (4) Midday halt; (5) Esquimaux and sleigh, Fort Churchill; (6) Arrival of Esquimaux at Fort Churchill; (7) *En route* for the north, near Lake Winnipeg; (8) Dogs trotting; (9) Building snow house; (10) Group of Chipewyan Indians near Fort Churchill; (11)

Esquimaux and sleigh, Fort Churchill; (12) Running with dogs; (13) Building kyaks; (14) Drying musk-ox robes, Fort Churchill; (15) Feeding dogs at Oxford House; (16) Arrival of Esquimaux at Fort Churchill; (17) Camp scene; (18) Hudson Bay Company's boat: Esquimaux on board trading; (19) Prince of Wales fort, Fort Churchill; (20) Mission church, Fort Churchill; (21) Building snow house; (22) Chipewyan Indian tents; (23–28) Fort Churchill; (29) Kyaks; (30) Esquimaux and snow house; (31) River near Fort Churchill; (32) Esquimaux arriving at Fort Churchill; (33) Running with dogs; (34) Drying musk-ox robes, Fort Churchill; (35) Chipewyan tents near Fort Churchill; (36) Esquimaux constructing snow house; (37–39) Dogs and carioles; (40) Dogs being fed, Oxford House; (41) Midday halt near York Factory; (42) Group of Chipewyan Indians near Fort Churchill; (43) Drying wolf-skins, Fort Churchill; (44) Kyaks tied together for carrying baggage; (45–48) Mr. Hanbury's dogs; (49) Esquimaux and sleigh, Fort Churchill; (50) Esquimaux sleighs and dogs approaching Fort Churchill; (51, 52) Fort Churchill; (53, 54) Esquimaux, Fort Churchill; (55) Esquimaux dogs; (56–59) Esquimaux and sleigh (sail set), Fort Churchill; (60) York Factory; (61) Officers' quarters, York Factory; (62) Norway house: a Hudson bay fort; (63) Arrival of Esquimaux at Fort Churchill; (64) Snow house, Fort Churchill; (65, 66) Building kyaks; (67) Esquimaux family on the coast of Hudson bay; (68) Cree Indians; (69) Group of Esquimaux; (70) Hauling up York boats in the Fall, Fort Churchill; (71) Hudson bay employés, Fort Churchill; (72) Esquimaux building snow house, Fort Churchill; (73) Buildings at York Factory; (74) Wharf, Fort Churchill; (75) Esquimaux dogs; (76, 77) Esquimaux dogs and cariole; (78, 79) Midday halt; (80) Blubber factory near Fort Churchill; (81) Building Kyaks; (82) Esquimaux searching head of his friend; (83) Esquimaux dog; (84) Group of Chipewyan Indians near Fort Churchill; (85) York Factory; (86) Esquimaux arriving at Fort Churchill with loads of venison; (87) Fort Churchill, inside view; (88) View from Fort Churchill of tidal lagoon (tide out); (89) Mission church, Fort Churchill; (90, 91) Mr. Hanbury's dogs; (92) My two trains of Esquimaux dogs; (93) No title.

East Africa. **Mardon.**

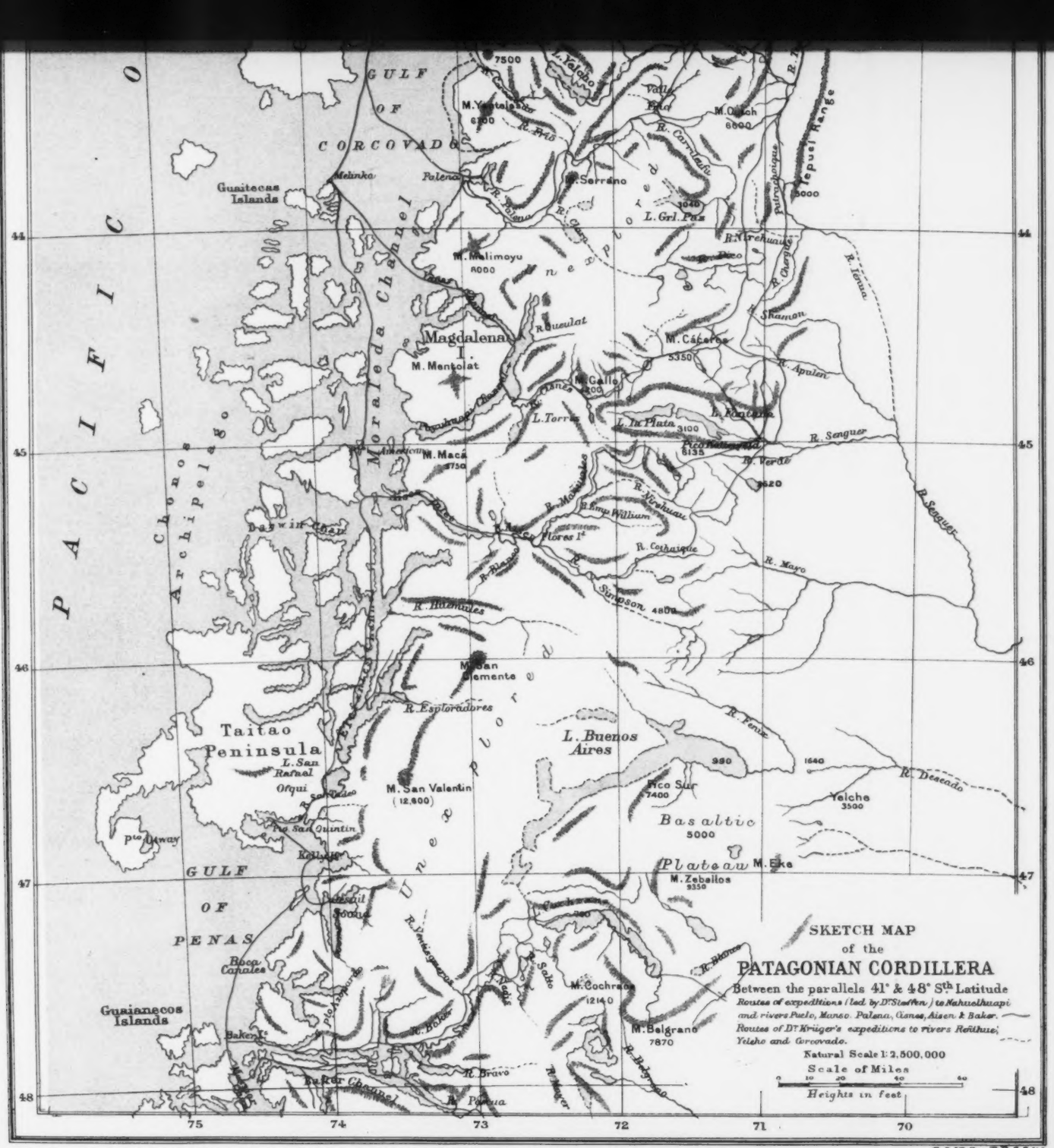
Fifty Photographs of East Africa, by E. J. Mardon, Esq. *Presented by E. J. Mardon, Esq.*

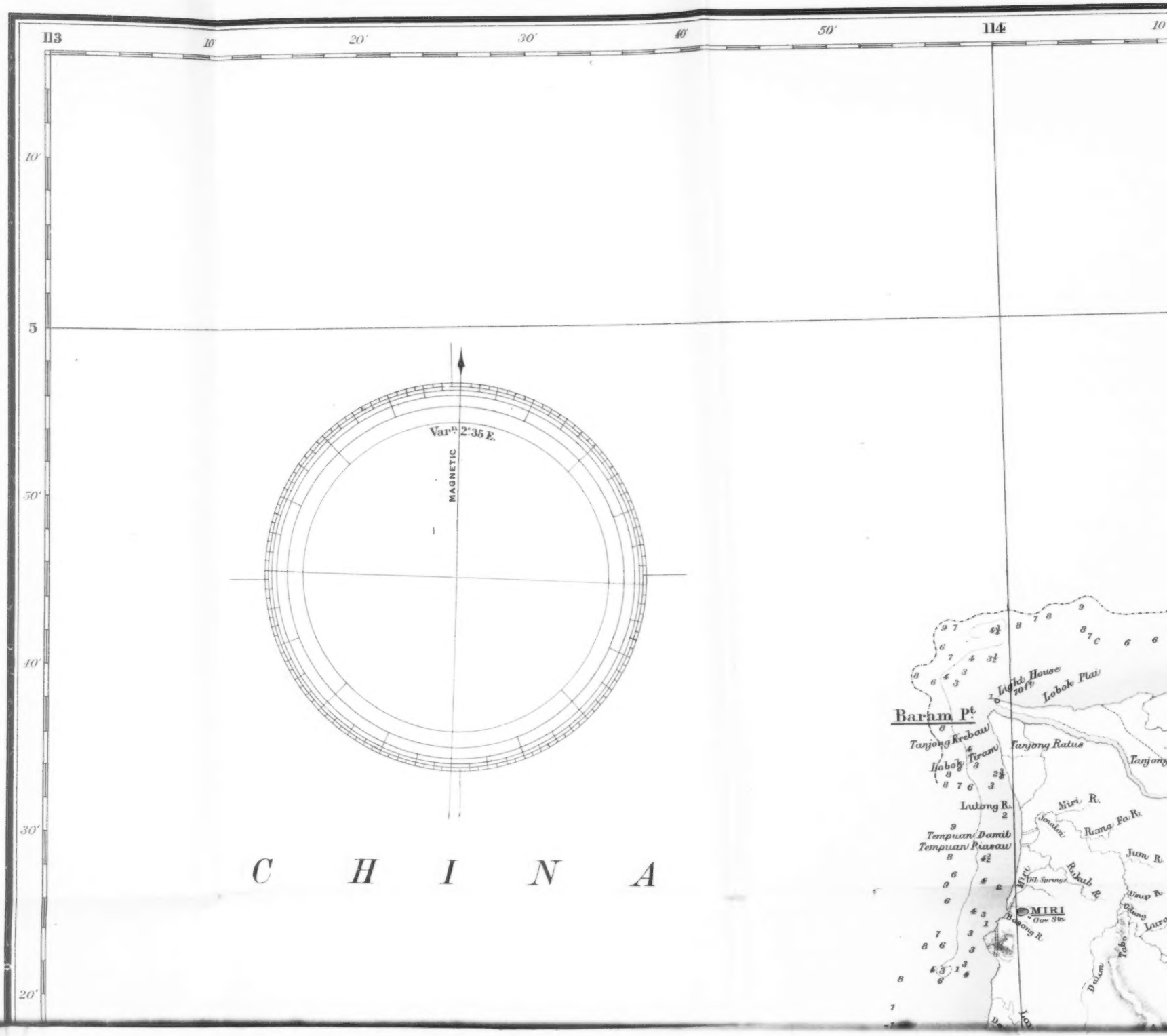
As the titles will show, with one or two exceptions these photographs were all taken in British East Africa, and serve well to illustrate the characteristic features of the country. Those of the escarpment region and the great rift valley are specially interesting.

(1) Tanga, German East Africa; (2) Principal street in Tanga; (3, 4) Mombasa harbour; (5–7) Mombasa fort; (8) Principal street in Mombasa; (9) Typical station on the Uganda railway; (10) Machokas plain, looking south. Fort in the distance; (11) Entrance to Fort Machakos; (12) Camp above Kidwani stream; (13) View from near Kidwani, looking south-east; (14) Valley of the Kidwani stream; (15) Valley of the Kawa stream; (16) Koma rock from north-east; (17) View of the Bebione and Kanjálu hills, from the Ngoleni ridge; (18) Donyo Sabuk, from north; (19, 20) View over plain from Donyo Sabuk; (21–23) Scenery on top of Donyo Sabuk; (24) Donyo Sabuk, looking towards Mount Kenia; (25, 26) View from the eastern slopes of Donyo Sabuk, of the Athi river, valley, and Kanjálu hills; (27, 28) View down the Athi valley; (29) Rapids on Athi; (30) Athi river; (31) Hippo pool on Athi; (32) Ford on Athi river; (33) Source of the Athi; (34) Lukenia rock at the end of the Ulu Kenia hills; (35, 36) Rift-valley from "rail-head" at the escarpment; (37, 38) View to the west from Erok to Kapotei across the rift-valley; (39) Gorge in which the Kilonito stream rises; (40) River Taruka from north side; (41) River Taruka from south side; (42) Camp on Gajwado river; (43) Crossing Gajwado river; (44) Gajwado river; (45) Melewo hills; (46) Gurgeish hills; (47) Masai hills; (48) View looking towards Kilimanjaro; (49) Masai women selling curd near railway; (50) Wakamba hunters near Donyo Sabuk.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

75
74
73
72
71
70
41
42
43
44
45
PACIFIC OCEAN
CHILOE I.
GULF OF CORCOVADO
Moraleda Channel
Chonos Archipelago
Magdalena I.
L. Llanquihue
L. Nahuelhuapi
Andes
Gunitecas Islands
Melinka
Palena
Castro
Chonchi
Ancud
Comau Inlet
Reloncavi Inlet
Huelas Range
Tepuel Range
R. Chubut
R. Senguer
R. Mayo
R. Corrientes
R. Palena
R. Yelcho
R. Futaleufu
R. Reñihue
R. Puelo
R. Manso
R. Tecka
R. Apulen
R. Verde
L. Epuyan
L. Superior
L. Grl. Paz
L. Torres
L. La Plata
V. Calbuco
V. Huequen
M. Yate
M. Tronador
M. Catedral
M. Thomas
M. Cerro Castillo
M. Mentolat
M. Macá
M. Melimoyu
M. Cáceres
M. Gallo
Emp. William
Flores I.
Darwin Bay
Puerto Montt
Puerto Varas
Esquel
Valle Nuevo
Valle Feliz
Valle Encantado
Lago Frio
Lago Fontana
Lago Guerrero
Lago Todos Santos
Lago Menendez
Lago Cochamo
Lago Torrecillas
Lago Verde
Lago Mascardi
Lago Nahuel Huapi
Lago Gutierrez
Lago Puelo
Lago Rodriguez
Lago Perez
Lago Meliquina
Lago Traful
Lago Correntoso
Lago Lacar
Lago Huechulafquen
Lago Quillen
Lago Paimun
Lago Ranco
Lago Rupanco
Lago Llanquihue
Lago Todos los Santos
Lago Esmeralda
Lago Cisnes
Lago Blanco
Lago Fontana
Lago Skottsberg
Lago Skyring
Lago Argentino
Lago Viedma
Lago Buenos Aires
Lago Pueyrredon
Lago Posadas
Lago Salitroso
Lago Cardiel
Lago Strobel
Lago Musters
Lago Colhue Huapi
Lago Fontana
Lago Blanco
Lago Skottsberg
Lago Skyring
Lago Argentino
Lago Viedma
Lago Buenos Aires
Lago Pueyrredon
Lago Posadas
Lago Salitroso
Lago Cardiel
Lago Strobel
Lago Musters
Lago Colhue Huapi


PACIFIC O
GULF OF CORCOVADO
Chonos Archipelago
Moraleda Channel
Gulf of Penas
Taitao Peninsula
Guaitecas Islands
Guaianecos Islands
Magdalena I.
M. Mentolat
M. Macá
M. San Clemente
M. San Valentin (12,600)
M. Cochrane 12140
M. Balmaceda
M. Balgrano 7870
M. Zeballos 9350
M. Cáceres 5350
M. Gallo
M. Melimoyu 6000
M. Yanteles 6300
M. Serrano
M. Castor 6000
L. Grl. Paz
L. Buenos Aires
L. Torres
L. La Plata 3100
Lago Belgrano 6135
Basaltic Plateau 5000
Tres Cruces
Cerro Fitz Roy 11000
Cerro Torre 10200
Cerro Paine 8700
Cerro Balmaceda 8000
Cerro Castillo 7500
Cerro Mayo 7000
Cerro Pingo 6000
Cerro Gorra Blanca 6000
Cerro Negro 6000
Cerro Guido 6000
Cerro Colorado 6000
Cerro Pico 6000
Cerro Pirámide 6000
Cerro Pinto 6000
Cerro Chalten 6000
Cerro Fraile 6000
Cerro Pluma 6000
Cerro Pilar 6000
Cerro Negro 6000
Cerro Gorra Blanca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114
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10'
5
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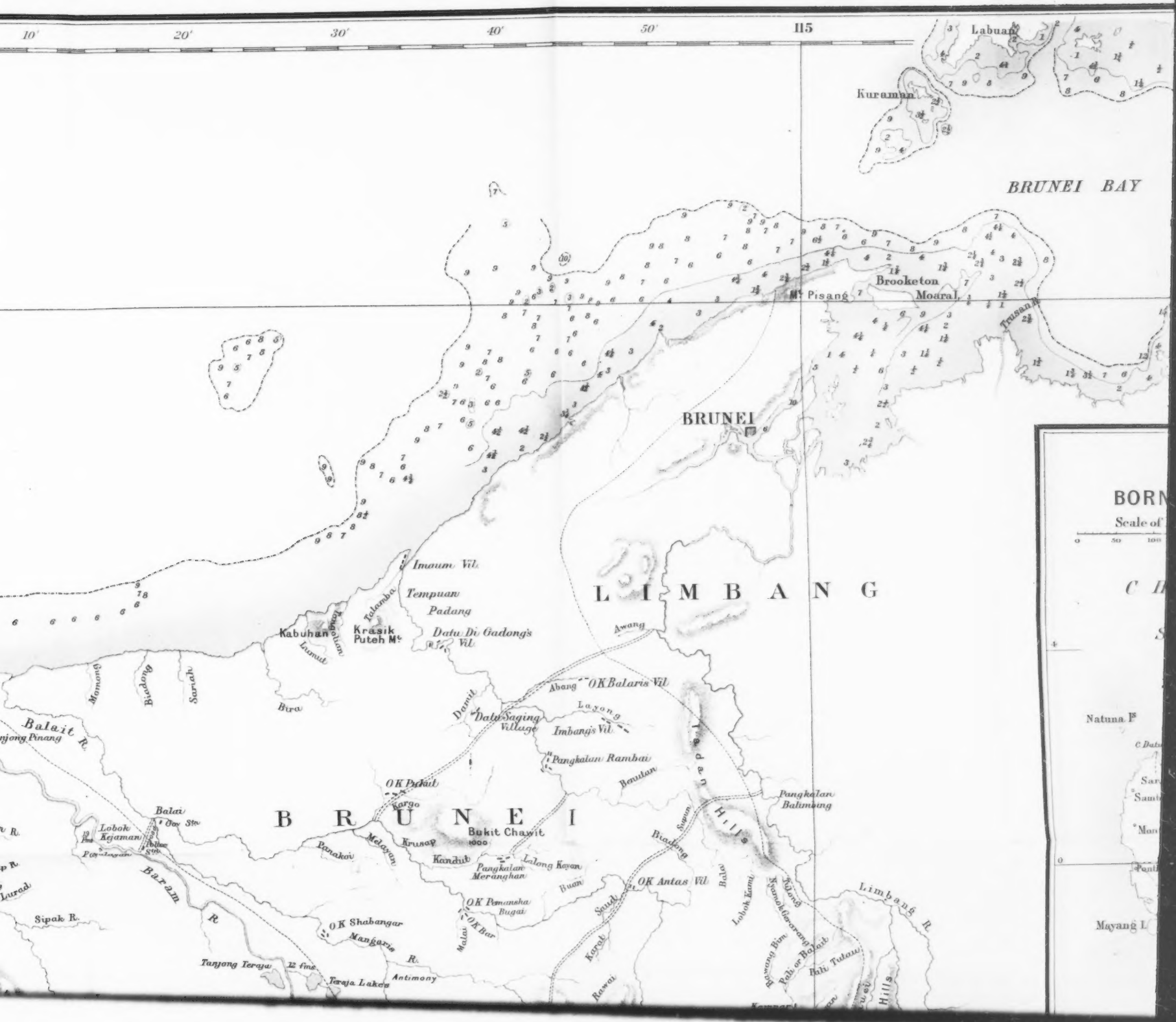
C H I N A
Baram Pt
Light House
70 ft
Lobok Plai
Tanjong Krebau
Lobok Tiram
Tanjong Ratus
Tanjong
Lutong R.
Miri R.
Tempuan Damit
Tempuan Piasau
Jum R.
Hot Springs
MIRI
Gov. Stn
Baram R.
Datum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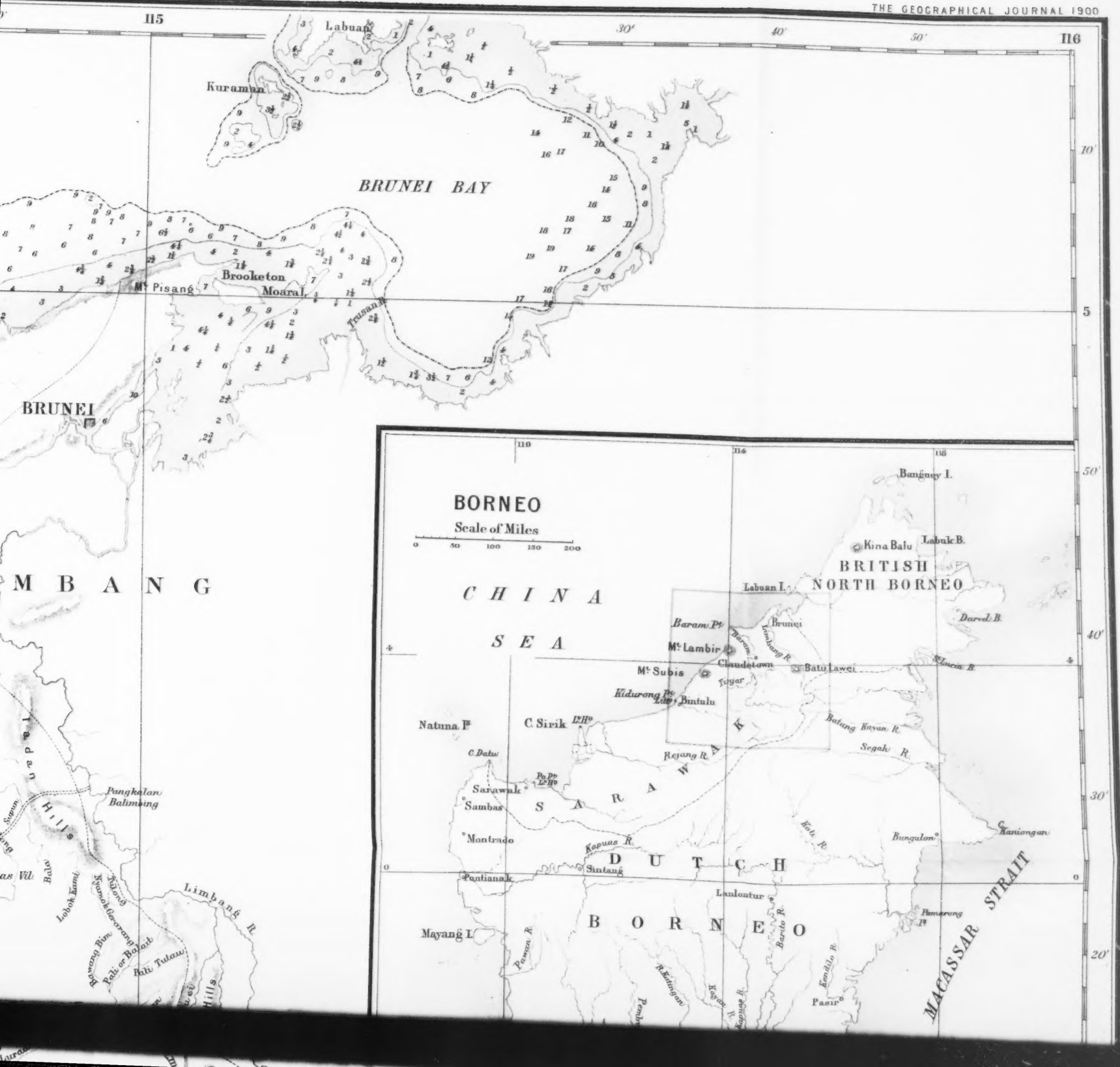
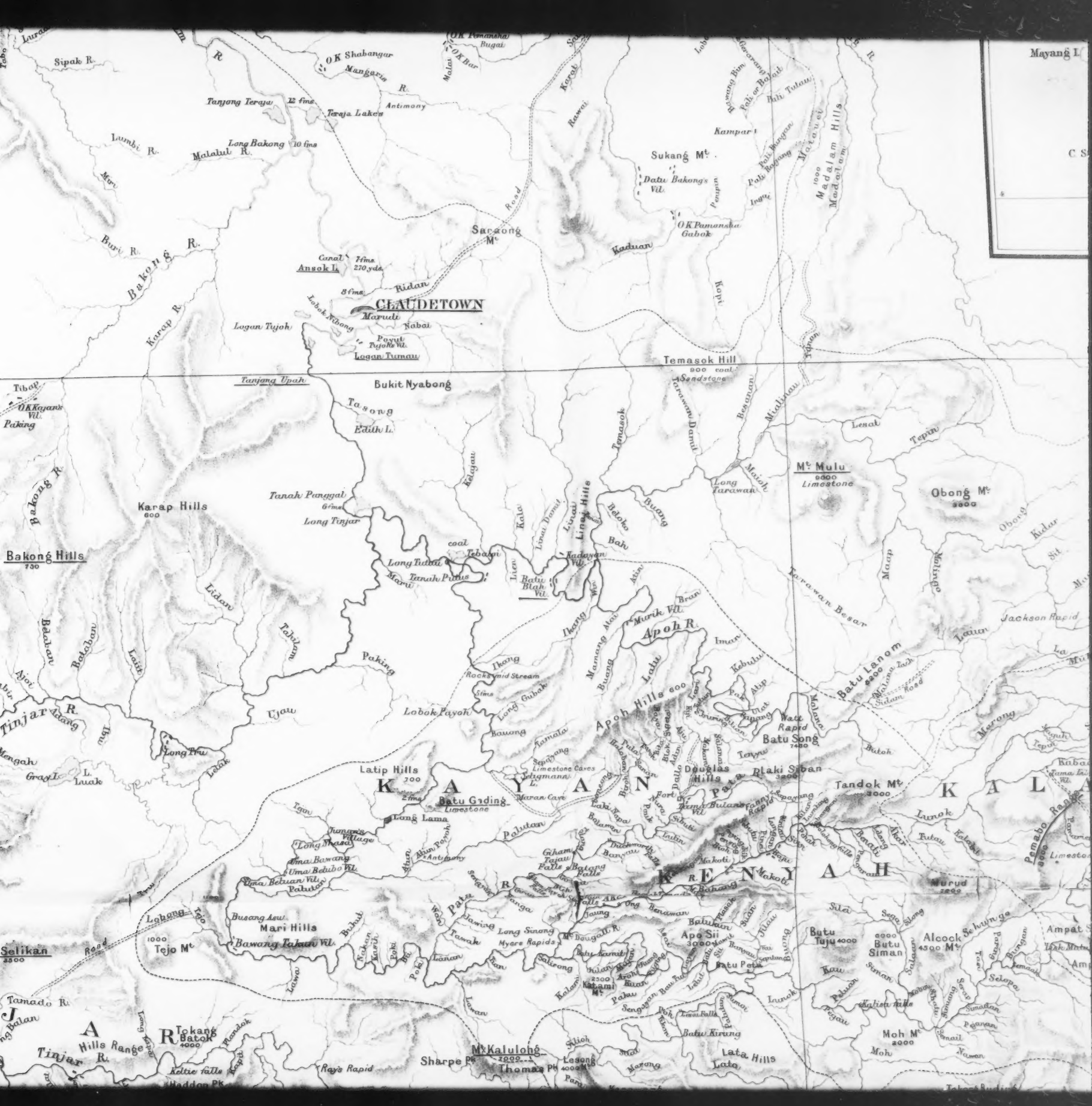
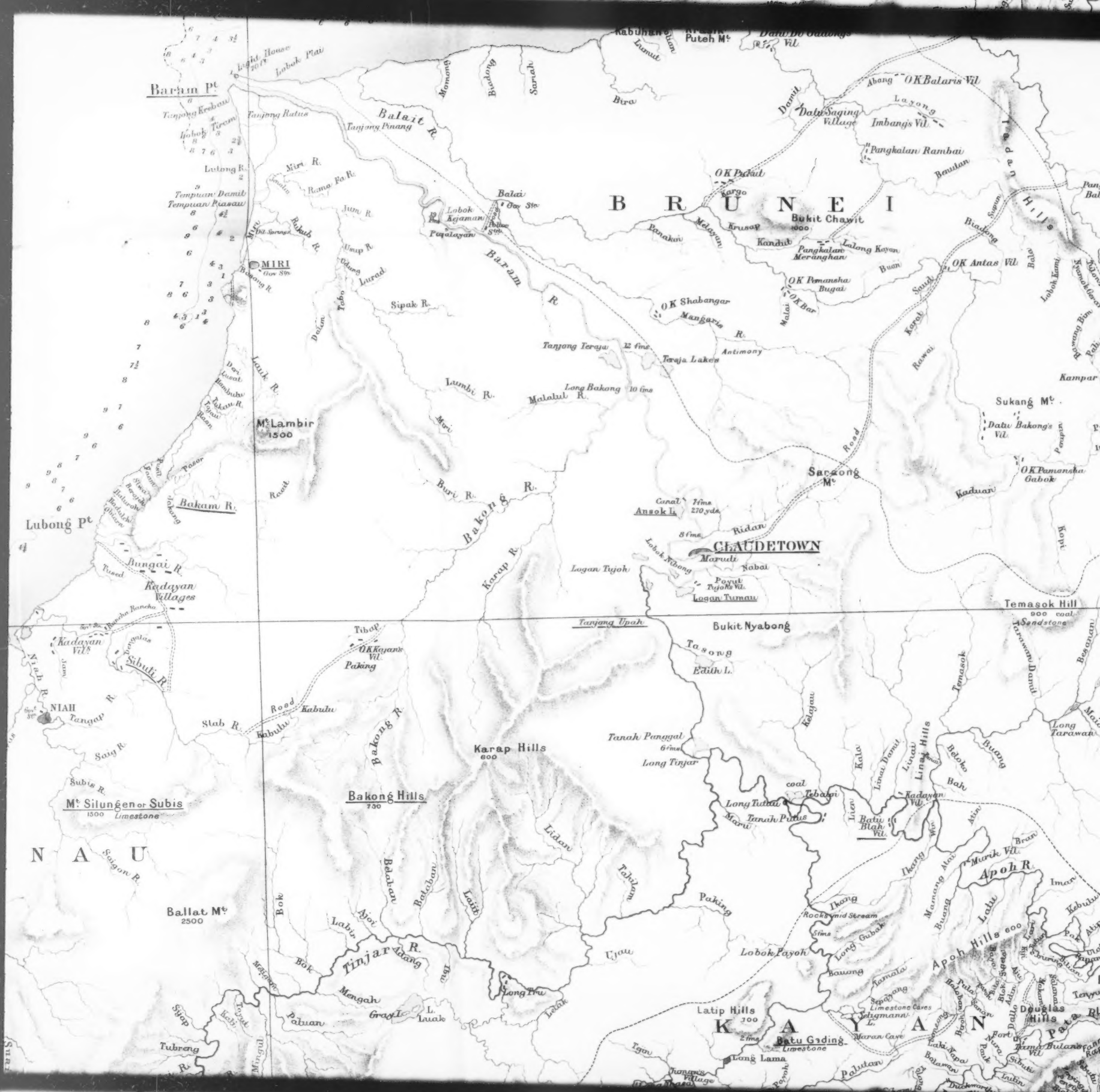
115
Labuan
Kuraman
BRUNEI BAY
Brooketon
Mt Pisang
Moaral
Trusan R.
BRUNEI
LIMBANG
Imaum Vil.
Tempuan
Padang
Talamba
Kabuhan
Krasik
Puteh Mt.
Datu Di Gadong's
Vil.
Awang
OK Balaris Vil.
Abang
Damit
Datu Saging
Village
Imbang's Vil.
Pangkalan Rambai
Boudan
Pangkalan
Balimbing
Tedan Hills
Bura
Momong
Budong
Sarah
Balait R.
Balai
Dav. Sta.
Lobok
Kejaman
Police
Sta.
OK Pakat
Kargo
BRUNEI
Bukit Chawit
1000
Krusap
Melayan
Panakan
Kandut
Pangkalan
Meranghan
Lalang Kayan
Buan
OK Antas Vil.
Bradong
Sugun
Balai
Lobok Kami
Limbang R.
Mayang L.
Natuna I.
Bazam
R.
Sipak R.
OK Shabangar
Mangaris
R.
OK Pemansha
Bugai
OK Bar
Malai
Saud
Karak
Rawai
Tanjong Teraja
12 fms.
Teraja Lakes
Antimony
Hills

40'
50'
114
10'
20'
30'
40'
50'
Baram Pt
Light House 70ft
Lobok Plai
Tanjong Krebau
Lobok Tiram
Tanjong Ratus
Tanjong Pinang
Balait R.
Lutong R.
Miri R.
Jamalan
Rama Pa R.
Tempuan Damit
Tempuan Piasau
Jun R.
Rakub R.
Oil Springs
MIRI
Gov Stn
Baram R.
Usup R.
Odang
Lurad
Sipak R.
Dalan
Tebo
Momang
Badong
Sariah
Bira
Kabuhan
Lumut
Krasik Puteh Mt
Imaum Vil
Tempuan Padang
Datu Di Gadong's Vil
Damit
Datu Saging Village
Abang
OK Balaris Vil
Imbang's Vil
Pangkalan Rambai
Bautan
OK Pekit
Cargo
Balai
Gov Stn
Lobok Kejaman
Police Stn
Pangkalan
B R U N E I
Bukit Chawit
1000
Krusap
Melayan
Panakan
Kandut
Pangkalan Meranghan
Lalong Kayan
Buan
OK Antas
OK Pemansha Bugai
OK Shabangar
Mangaris R.
Malai
OK Bar
Baram R.
Tanjong Teraja
12 fms
Teraja Lakes
Antimony
Saud
Kerak
Rawai
Awang
Lasong
Biadong
Sugun

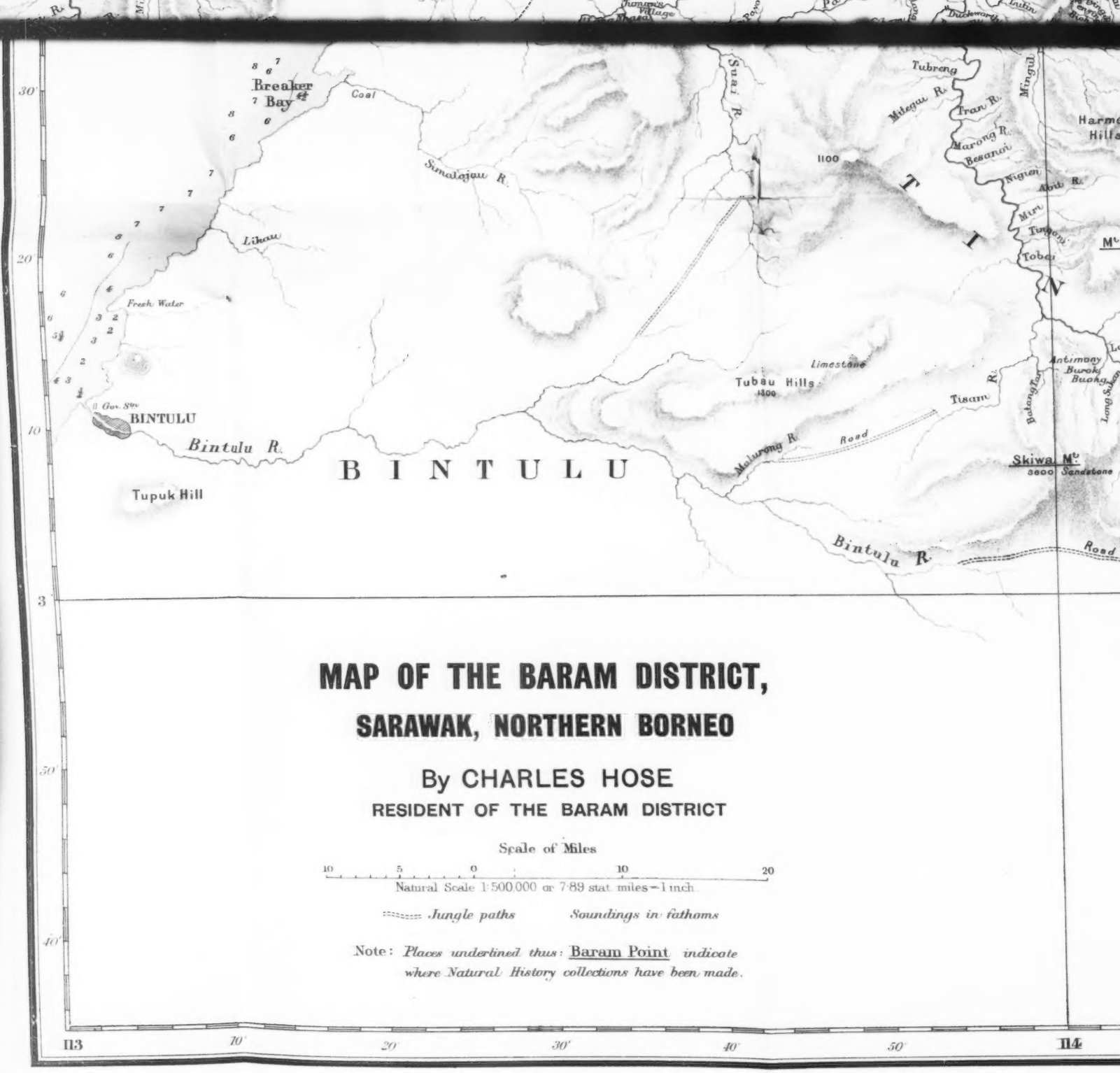

115
116
30'
40'
50'
10'
5
Labuan
Kuraman
BRUNEI BAY
Brooketon
Mt Pisang
Moaral
Trusan R.
BRUNEI
M B A N G
Pangkalan Balimbing
Hills
Limbang R.
Lobok Kami
Nyamok Kecarang
Bawang Bim
Pali or Bajok
Bali Tulau
BORNEO
Scale of Miles
0 50 100 150 200
CHINA SEA
Banguey I.
Kina Balu
Labuk B.
BRITISH NORTH BORNEO
Labuan I.
Baram Pt
Brunei
Baram R.
Limbang R.
Mt Lambir
Claudetown
Batu Lawei
Darvel B.
St Lucas B.
Mt Subis
Tuyar
Kidurong Pt
Buntulu
Natuna Is
C. Sirik
Lt Ho
C. Datu
Rejang R.
Batang Kayan R.
Segah R.
SARAWAK
Sarawak
Sambas
Montrado
Kapuas R.
Kaniongan
Bungulon
Koti R.
DUTCH
Sintang
Pontianak
Lanlontur
Mayang I.
Pawan R.
Barito R.
Pamarong Is
Kendilo R.
Pasir
MACASSAR STRAIT
4
0

SEA
MELANAU
Lubong Pt
Bakam R.
Bungai R.
Kadayan Villages
Kadayan Vill.
Sibuti R.
NIAH
Tangap R.
Niah R.
Stab R.
Saig R.
Subis R.
Mt. Silungen or Subis
1500 Limestone
Suai R.
Suai Road
Talang R.
Sibatu
Saigon R.
Ballat Mt.
2500
Nyalo R.
Breaker Bay
Coal
Simalajau R.
Likau
Fresh Water
Tubau Hills
Limestone
Mt. Lambir
1500
Lauk R.
Baram R.
Tubau R.
Tutoh R.
Bok
Tubreng
Midgau R.
Tran R.
Marong R.
Besanoi
Harmer Hills
1100
Nigion
Abit R.
Miri
Tinjar
Mt. Selikan
Tobai
Long Balan
Antimony
Buroh
Pabuan
Kabulu
Road
Tasek
Kali
Sipop
Mengah
Labir
Ajon
Tamao
Pako


Sipak R.
OK Shabangar
Mangaris R.
Tanjong Teraja
12 fms
Teraja Lakes
Antimony
Lumbi R.
Long Bakong
10 fms
Malalut R.
Mur
Buri R.
Bakong R.
Karap R.
Canal
Ansok L.
7 fms
270 yds.
8 fms
Ridan
CLAUDETOWN
Maruti
Nabai
Povut
Tujoh Vil.
Logan Tumau
Logan Tujoh
Lobok Mbong
Tanjong Upah
Bukit Nyabong
Tibob
OK Kayans Vil.
Paking
Ta song
Edith L.
Karap Hills
600
Tanah Panggal
6 fms
Long Tinjar
Bakong Hills
730
Bakong R.
Lidan
Balaban
Batoban
Laite
Ajot
Tinjar R.
Long Tutut
Tanah Putus
Maru
coal
Tebalai
Long Pau
Lolak
Gray I.
L. Luak
Mengah
Paking
Ujau
Lobok Payoh
Rocky mid Stream
5 fms
Long Gubak
Ikang
Tahilan
Latip Hills
700
Batu Gading
Limestone
Long Lama
Tegu
Jungan's Village
Long Nyasa
Uma Bawang
Uma Bebuho Vil.
Uma Betuan Vil.
Paluton
Lahang
Busang Asu
Mari Hills
Bawang Tahan Vil.
Tejo Mt
1000
Selikan
2500
Road
Tamado R.
Tinjar R.
Hills Range
Tokang Batok
4000
Kettle falls
Haddon Pk
Ray's Rapid
Sharpe Pk
Mt Kalulong
2000
Thomas Pk
4000
Lesong
Marong
Lata Hills
Lata
Moh Mt
2000
Moh
Nawan
Tabang Budiuk
Sarawong Mt
Kaduan
OK Pamansha Gabok
Sukang Mt
Datu Bakong's Vil.
Kampar
Pah Tutau
Madalam Hills
Madalam
Temasok Hill
900 coal
Sandstone
Temasok
Tarawan Damit
Besanan
Mialjuau
Lesat
Tepun
Mt Mulu
2000
Limestone
Long Tarawan
Maioh
Obong Mt
3000
Obong
Kidar
Maap
Malingo
Tarawan Besar
Jackson Rapid
Laiun
Batu Lanom
3200
Sidam Road
Merong
Tepun
Kabah
Tuma Lai Vil.
Pemabo Range
3000
Limestone
Tandok Mt
3000
Lunok
Tutau
Kalokot
Batu Song
7400
Watt Rapid
Douglas Hills
Plaki Siban
3200
Fort
Tama Bulan Vil.
Apoh R.
Apoh Hills
600
Kebulu
Imar
Murik Vil.
Bran
Ikang
Manang Mau
Buang
Lahu
Batoko
Bah
Kadayan Vil.
Batu Blah Vil.
Linau Hills
Linau Damit
Kala
Kalgau
Tanah Purus
Lian
Atun
Wan
Kadayan
Buang
Tarawan Besar
Apoh Hills
Batu Song
Tepun
Butoh
Merong


Barram Pt
Light House 20 ft
Lobok Pau
Tanjong Kreban
Tanjong Ratus
Tanjong Penang
Balait R.
Momong
Biadong
Sariah
Bira
Lumut
Puteh Mt
Abang
OK Balaris Vil
Layong
Datu Saging Village
Imbang's Vil
Pangkalan Rambai
Beaufort Hills
Lubong R.
Miri R.
Rama Fa R.
Tempuan Damit
Tempuan Piasau
Balai
Gov Stn
Lobok Kejaman
Police Stn
Panalayan
B R U N E I
Bukit Chawit
1000
Kandut
Pangkalan Meranghan
Lalang Kayan
OK Antas Vil
OK Pamansha Bugai
OK Shabangar
Mangaris R.
Jum R.
Umup R.
Baram R.
Sipak R.
MIRI
Gov Stn
Baraong R.
Lurad
Tebo
Dalan
Tanjong Teraju
12 fms
Antimony
Teraja Lakes
Lumbi R.
Long Bakong
10 fms
Malabul R.
Lubong Pt
Lutk R.
Mt Lambir
1500
Bakam R.
Buri R.
Bakong R.
Sukang Mt
Datu Bakong's Vil
Sarawak
Road
Canal
Ansok L.
7 fms
270 yds
8 fms
Ridan
CLAUDETOWN
Maruti
Nabai
Logan Tujoh
Logan Tumau
Karap R.
OK Pamansha Gabok
Kaduan
Kopi
Bungai R.
Kadayan Villages
Tanjong Upah
Bukit Nyabong
Temasok Hill
900 coal
Sandstone
Tibap
OK Kayan's Vil
Paking
Kadayan Vil's
Sibuti R.
NIAH
Tangap R.
Stab R.
Kabulu
Tasong
Edith L.
Tanah Panggal
6 fms
Long Tinjar
Karap Hills
600
Bakong Hills
730
Mt Silungen or Subis
1500
Limestone
Subis R.
Saiy R.
Saigon R.
N A U
Ballat Mt
2500
Tinjar R.
Tinjar Ulang R.
Long Tru
Gray L.
Luak
Latip Hills
700
Batu Gading
Limestone
Long Lama
Tubreng
Sibop
Trout
Kelit
Mengah
Paluan
Lobok Payoh
Long Gubak
Rocky mid Stream
5 fms
Coal
Tabalai
Long Tutuai
Tanah Putus
Batu Blah Vil
Kadayan Vil
Temasok
Kelagau
Linai Hills
Linai Damit
Kala
Buang
Beloko
Bah
Long Tarawan
Tarawan Damit
Besanan
Apoh R.
Murik Vil
Iman
Apoh Hills
600
Douglas Hills
Para R
Sibuti
Lubin
Duckworth
Paludan
Bajawan
Tamor Bulan
Kampar
Rawai
Karak
Saud
Buan
Malai
Bar
Lobok Kumi
Pangkalan Buan
Sungai
Biadong
Bakong
Lurad
Tebo
Dalan
Lutk
Mirl
Baraong
Umup
Jum
Miri
Rama Fa
Lubong
Tempuan
Balait
Tanjong Penang
Tanjong Ratus
Lobok Tarom
Barram Pt
Lobok Pau
Light House
Momong
Biadong
Sariah
Bira
Lumut
Puteh Mt
Abang
OK Balaris Vil
Layong
Damit
Datu Saging Village
Imbang's Vil
Pangkalan Rambai
Beaufort Hills
Bautan
OK Pandut
Kargo
Sungai
Biadong
Pangkalan Meranghan
Lalang Kayan
Bukit Chawit
1000
Kandut
Panakan
Melayan
Krusap
Baram R.
Buan
OK Antas Vil
Saud
Karak
Rawai
Kampar
Sukang Mt
Datu Bakong's Vil
Sarawak
Road
OK Pamansha Gabok
Kaduan
Kopi
Sarawak Mt
Canal
Ansok L.
7 fms
270 yds
8 fms
Ridan
CLAUDETOWN
Maruti
Nabai
Lobok Nibong
Logan Tujoh
Payuk Tujoh Vil
Logan Tumau
Karap R.
Bakong R.
Buri R.
Mirl
Lumbi R.
Long Bakong
10 fms
Malabul R.
Tanjong Teraju
12 fms
Antimony
Teraja Lakes
Lubong Pt
Lutk R.
Mt Lambir
1500
Bakam R.
Jokong
Tasek
Pasar
Road
Bungai R.
Kadayan Villages
Tanjong Upah
Bukit Nyabong
Temasok Hill
900 coal
Sandstone
Tibap
OK Kayan's Vil
Paking
Kadayan Vil's
Sibuti R.
NIAH
Tangap R.
Stab R.
Kabulu
Road
Tasong
Edith L.
Tanah Panggal
6 fms
Long Tinjar
Karap Hills
600
Bakong Hills
730
Mt Silungen or Subis
1500
Limestone
Subis R.
Saiy R.
Saigon R.
N A U
Ballat Mt
2500
Tinjar R.
Tinjar Ulang R.
Long Tru
Gray L.
Luak
Latip Hills
700
Batu Gading
Limestone
Long Lama
Tubreng
Sibop
Trout
Kelit
Mengah
Paluan
Lobok Payoh
Long Gubak
Rocky mid Stream
5 fms
Coal
Tabalai
Long Tutuai
Tanah Putus
Batu Blah Vil
Kadayan Vil
Temasok
Kelagau
Linai Hills
Linai Damit
Kala
Buang
Beloko
Bah
Long Tarawan
Tarawan Damit
Besanan
Apoh R.
Murik Vil
Iman
Apoh Hills
600
Douglas Hills
Para R
Sibuti
Lubin
Duckworth
Paludan
Bajawan
Tamor Bulan
Kampar
Rawai
Karak
Saud
Buan
Malai
Bar
Lobok Kumi
Pangkalan Buan
Sungai
Biadong
Bakong
Lurad
Tebo
Dalan
Lutk
Mirl
Baraong
Umup
Jum
Miri
Rama Fa
Lubong
Tempuan
Balait
Tanjong Penang
Tanjong Ratus
Lobok Tarom
Barram Pt
Lobok Pau
Light House
Momong
Biadong
Sariah
Bira
Lumut
Puteh Mt
Abang
OK Balaris Vil
Layong
Damit
Datu Saging Village
Imbang's Vil
Pangkalan Rambai
Beaufort Hills
Bautan
OK Pandut
Kargo
Sungai
Biadong
Pangkalan Meranghan
Lalang Kayan
Bukit Chawit
1000
Kandut
Panakan
Melayan
Krusap
Baram R.
Buan
OK Antas Vil
Saud
Karak
Rawai
Kampar
Sukang Mt
Datu Bakong's Vil
Sarawak
Road
OK Pamansha Gabok
Kaduan
Kopi
Sarawak Mt
Canal
Ansok L.
7 fms
270 yds
8 fms
Ridan
CLAUDETOWN
Maruti
Nabai
Lobok Nibong
Logan Tujoh
Payuk Tujoh Vil
Logan Tumau
Karap R.
Bakong R.
Buri R.
Mirl
Lumbi R.
Long Bakong
10 fms
Malabul R.
Tanjong Teraju
12 fms
Antimony
Teraja Lakes
Lubong Pt
Lutk R.
Mt Lambir
1500
Bakam R.
Jokong
Tasek
Pasar
Road
Bungai R.
Kadayan Villages
Tanjong Upah
Bukit Nyabong
Temasok Hill
900 coal
Sandstone
Tibap
OK Kayan's Vil
Paking
Kadayan Vil's
Sibuti R.
NIAH
Tangap R.
Stab R.
Kabulu
Road
Tasong
Edith L.
Tanah Panggal
6 fms
Long Tinjar
Karap Hills
600
Bakong Hills
730
Mt Silungen or Subis
1500
Limestone
Subis R.
Saiy R.
Saigon R.
N A U
Ballat Mt
2500
Tinjar R.
Tinjar Ulang R.
Long Tru
Gray L.
Luak
Latip Hills
700
Batu Gading
Limestone
Long Lama
Tubreng
Sibop
Trout
Kelit
Mengah
Paluan
Lobok Payoh
Long Gubak
Rocky mid Stream
5 fms
Coal
Tabalai
Long Tutuai
Tanah Putus
Batu Blah Vil
Kadayan Vil
Temasok
Kelagau
Linai Hills
Linai Damit
Kala
Buang
Beloko
Bah
Long Tarawan
Tarawan Damit
Besanan
Apoh R.
Murik Vil
Iman
Apoh Hills
600
Douglas Hills
Para R
Sibuti
Lubin
Duckworth
Paludan
Bajawan
Tamor Bulan

Kidurong Pt.
Bintulu
Batang Kayan R.
Natuna Is
C. Sirik
Segah R.
Rejang R.
C. Datu
Sarawak
S A R A W A K
Sambas
Kapuas R.
Mantrado
Bungulon
C. Kaniongan
D U T C H
Sintang
Pontianak
Lanlontur
Pamarong Is
B O R N E O
Mayang I.
Pawan R.
Barito R.
MACASSAR STRAIT
Pasir
C. Sambar
Banjermasin
Laut I.
C. Moladajo
J A V A S E A
Pangkalan Balimbing
Limbang R.
Madalam Hills
Batu Lawai
8000
Limestone
Lesat
Tepin
Mt. Mulu
8000
Limestone
Obong Mt.
3800
Obong
Kidar
Sil
Mago
Puah
Maap
Kolupo
Terawan Besar
Limbang R.
Trusan R.
Jackson Rapid
Batu Lanam
4200
Batu Song
7400
Tandok Mt.
3000
K A L A B I T
Ridgeway
Pk
Bodok Wa
Mts
3000
Bodok Bayang
4000
Modong Mt.
4700
Irrigated
Pabawan
Barong Sagate
Kadayan or Karayan
Leppu Mauto Vil.



MAP OF THE BARAM DISTRICT,

SARAWAK, NORTHERN BORNEO

By CHARLES HOSE

RESIDENT OF THE BARAM DISTRICT

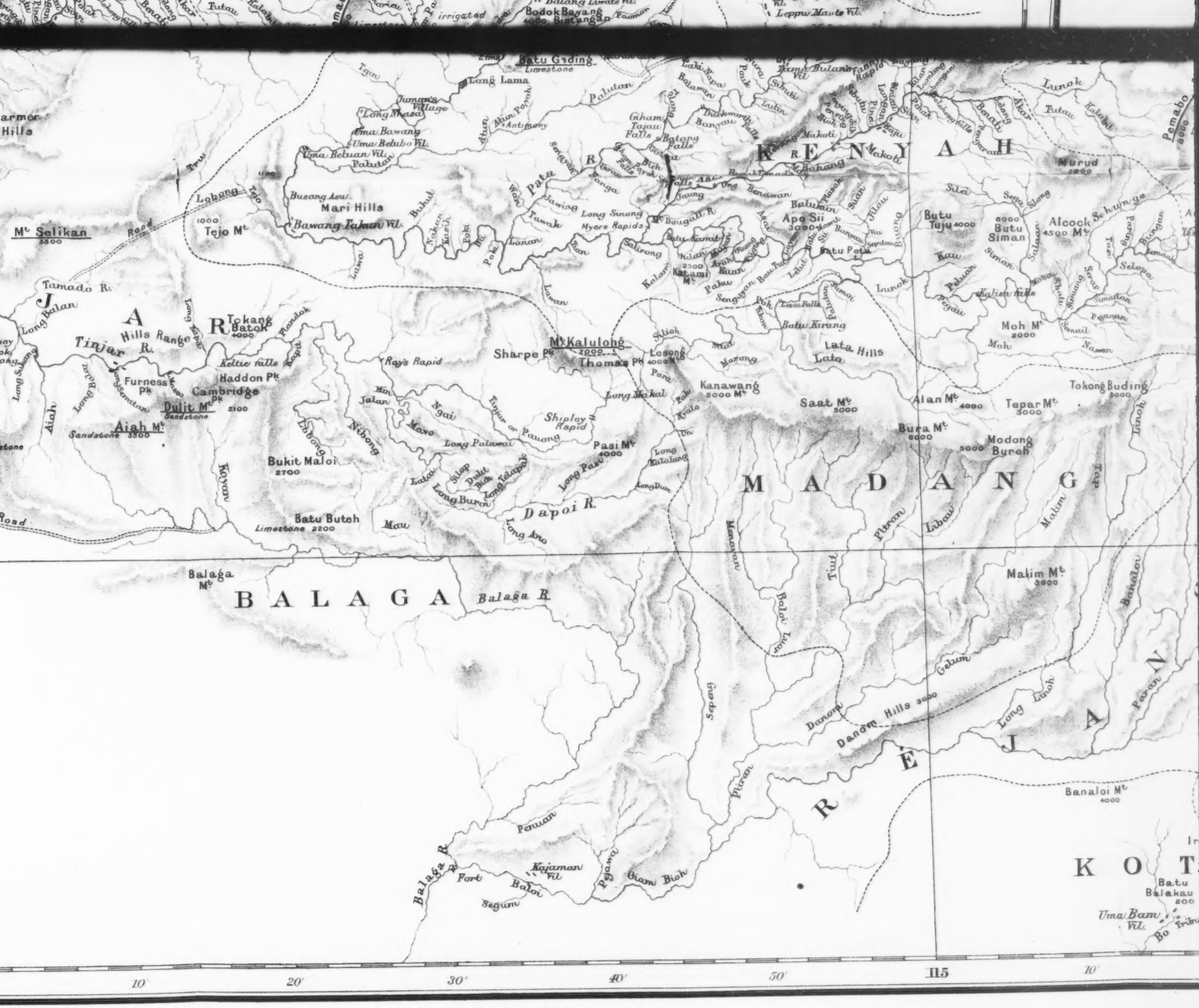
Scale of Miles

10 5 0 10 20

Natural Scale 1:500,000 or 7·89 stat. miles = 1 inch.

..... *Jungle paths* *Soundings in fathoms*

Note: *Places underlined thus:* Baram Point *indicate where Natural History collections have been made.*



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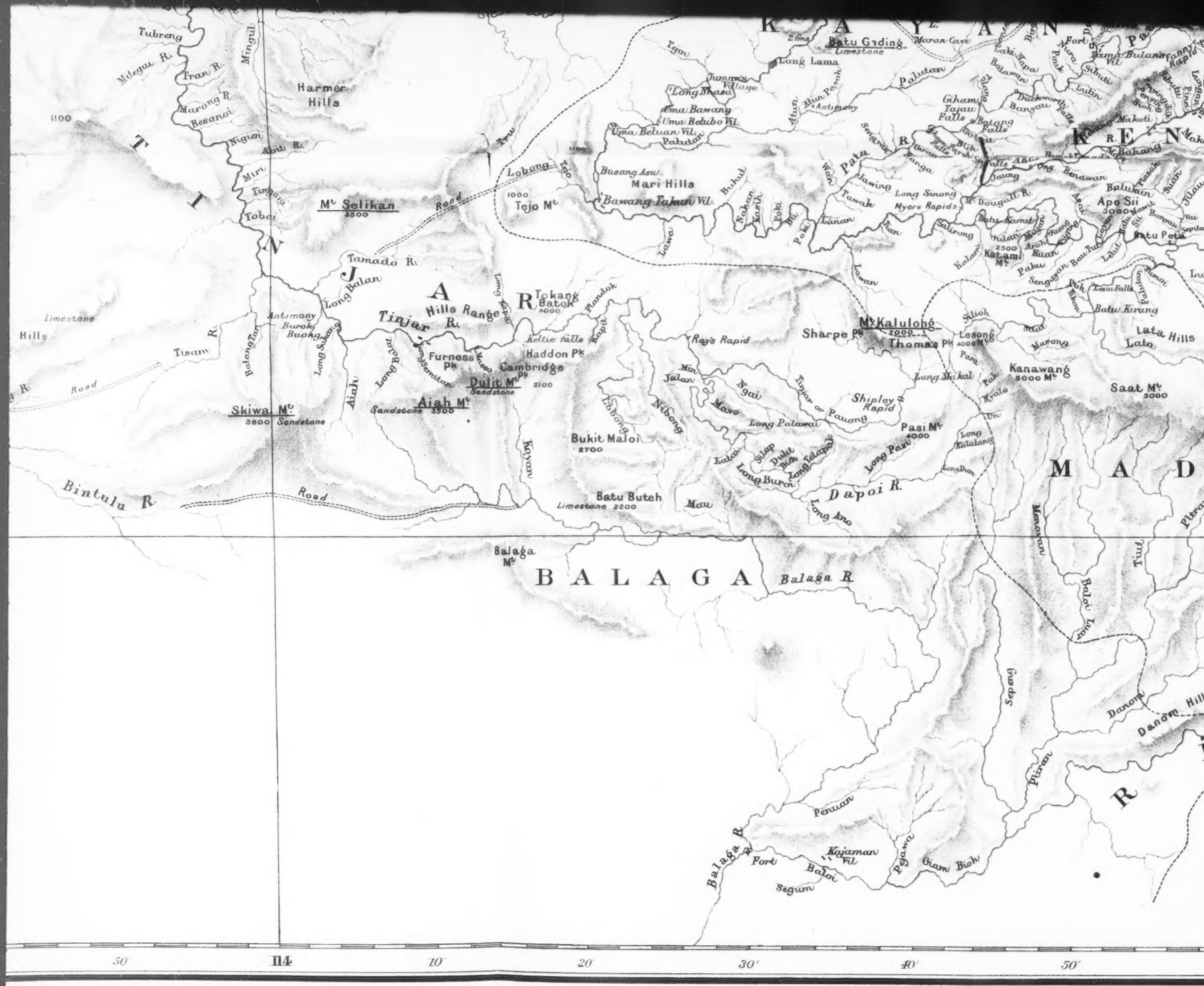
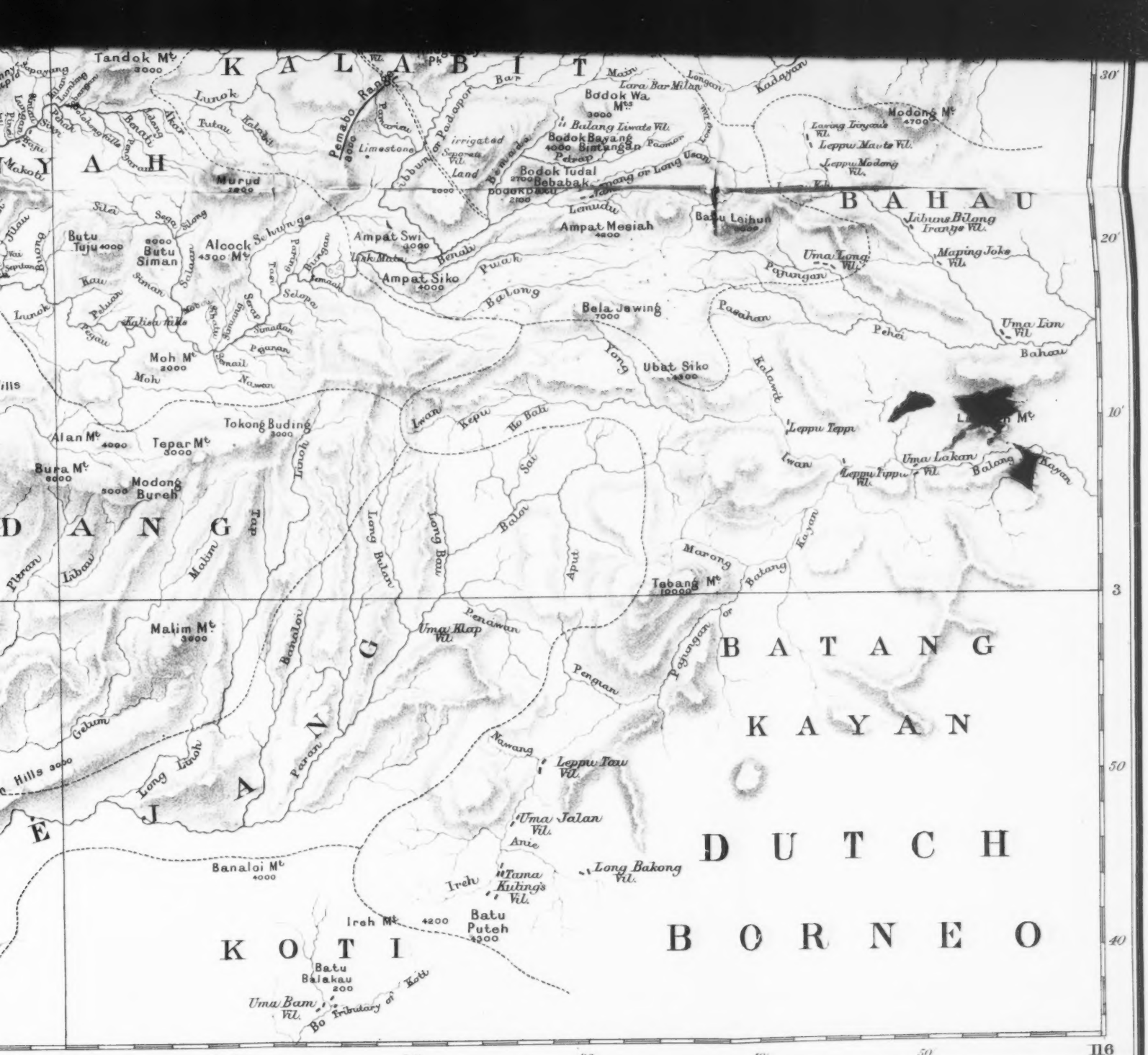
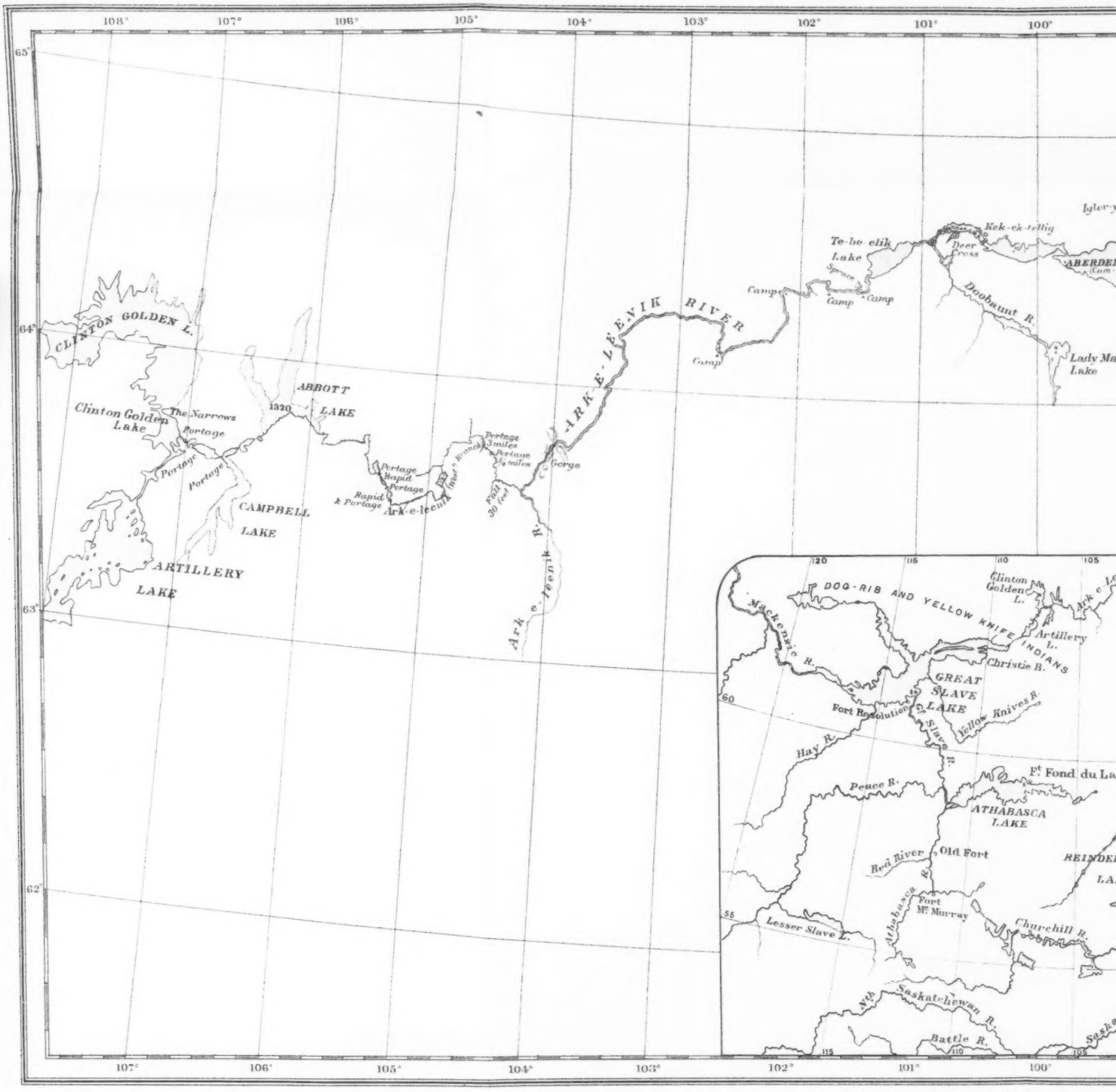

Tubreng
Mingul
Mitegas R.
Tran R.
Marong R.
Besanoi
Harmer Hills
1100
Nigian
Abit R.
Miri
Tungoni
Tobai
Mt Selikan 3500
Road
Tejo Mt 1000
Lahang
Tejo
Busang Asu
Mari Hills
Bawang Tahan Vil.
Tamado R.
Long Balan
Limestone Hills
Antimony
Buroh
Buoho
Long Sakang
Tisam R.
Balang Tar
Road
Tinjar R.
Hills Range
Tokang Batok 4000
Long Lapai
Pandok
Keltie falls
Koapit
Furness Pk
Haddon Pk
Cambridge
Long Semetan
Dulit Mt Pk 5100
Sandstone
Skiwa Mt 3600 Sandstone
Aiah Mt Sandstone 3500
Aiah
Long Bedian
Bukit Maloi 2700
Kuyan
Batu Buteh Limestone 2200
Bintulu R.
Road
Balaga Mt
BALAGA
Balaga R.
Batu Gading Limestone
Long Lama
Tegu
Long Bhasa
Uma Bawang
Uma Bebubo Vil.
Uma Beluan Vil.
Pahutan
Palutan
Abun
Abun Parah Antimony
Ba
Ba
Ba


K A L A B I T
B A H A U
D A N G
B A T A N G
K A Y A N
D U T C H
B O R N E O
K O T I
Tandok Mt 2000
Lunok
Murud 1220
Pemabo Range
Limestone
Bodok Wa Mts 3000
Bodok Bayang 4000
Bodok Tudal 4700
Bebabak 2100
Ampat Swi 4000
Ampat Siko 4000
Ampat Mesiah 4800
Batu Lajhun 3000
Alcock 4300 Mt
Butu Tuju 4000
Butu Siman 3000
Moh Mt 2000
Bela Jawing 7000
Ubat Siko 4300
Tebang Mt 10000
Modong Mt 4700
Alan Mt 4000
Tepar Mt 3000
Bura Mt 4000
Modong Bureh 3000
Tokong Buding 3000
Malim Mt 3000
Banaloi Mt 4000
Irch Mt 4200
Batu Putch 3300
Batu Balakau 200
Uma Bam Vil.
Bo Tributary of Kotl
Uma Klap Vil.
Uma Jalan Vil.
Long Bakong Vil.
Tama Kubing's Vil.
Leppu Tau Vil.
Leppu Tepp
Uma Lakan
Uma Lim Vil.
Uma Luna Vil.
Maping Joke Vil.
Leppu Modong Vil.
Leppu Maute Vil.
Lubuns Bilang Iranje Vil.
Bulang Liwats Vil.
Lara Bar Milan
Lunok
Tutau
Kalabit
Sila
Segar Silang
Alcock Schwinge
Ampat Swi
Ampat Siko
Balong
Pwak
Pasahan
Peha
Bahau
Kalawit
Iwan
Kepu
Ile Bak
Long Balan
Long Bau
Balan
Sai
Apui
Marong
Batang Kayan
Penaiwan
Pengran
Pelungan or
Nawang
Arie
Ireh
Long Linoh
Peran
Banaloi
Gelum
Libau
Malim
Tepar
Linoh
Pleran
Kelabit Hills
Long Bawang or Long Usan
Pasir
Lemudu
Selopa
Pwak
Penaiwan
Tama Kubing's Vil.
Leppu Tepp
Uma Lakan
Leppu Tepp Vil.
Uma Lim Vil.
Bahau
Maping Joke Vil.
Uma Luna Vil.
Leppu Modong Vil.
Modong Mt 4700
Lubuns Bilang Iranje Vil.
Leppu Maute Vil.
Bulang Liwats Vil.
Lara Bar Milan
Kalayan
Pasir
Lemudu
Selopa
Pwak
Penaiwan
Pengran
Pelungan or
Nawang
Arie
Ireh
Long Linoh
Peran
Banaloi
Gelum
Libau
Malim
Tepar
Linoh
Pleran
Kelabit Hills
Long Bawang or Long Usan
Pasir
Lemudu
Selopa
Pwak
Penaiwan
Tama Kubing's Vil.
Leppu Tepp
Uma Lakan
Leppu Tepp Vil.
Uma Lim Vil.
Bahau
Maping Joke Vil.
Uma Luna Vil.
Leppu Modong Vil.
Leppu Maute Vil.
Lubuns Bilang Iranje



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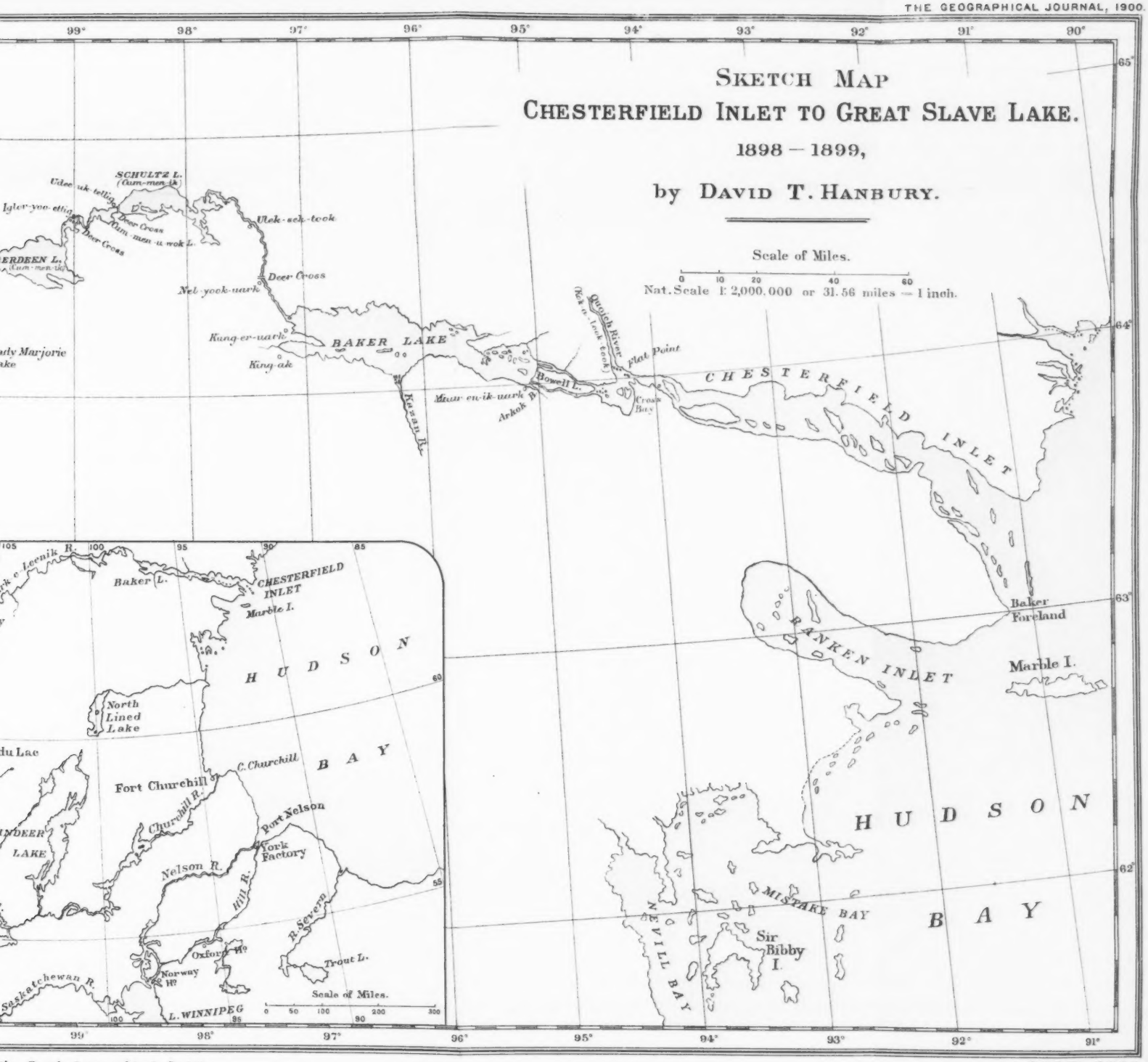

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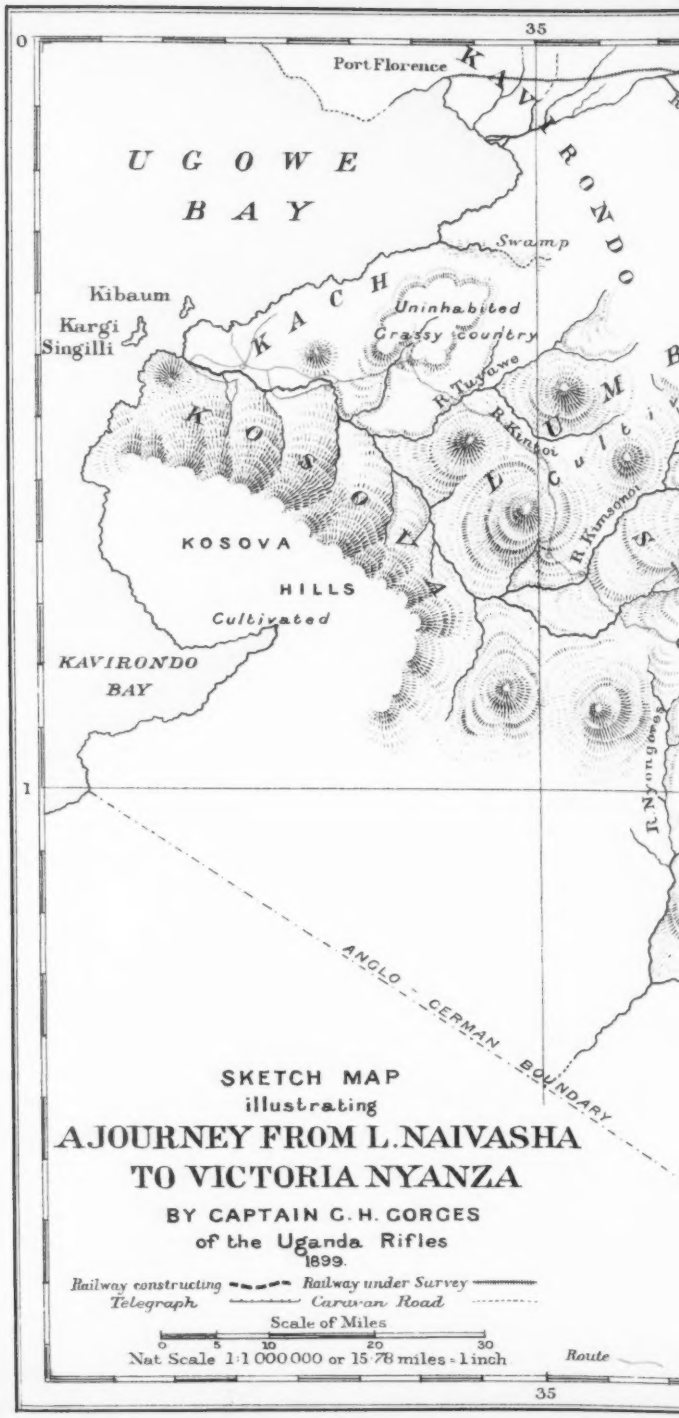
35
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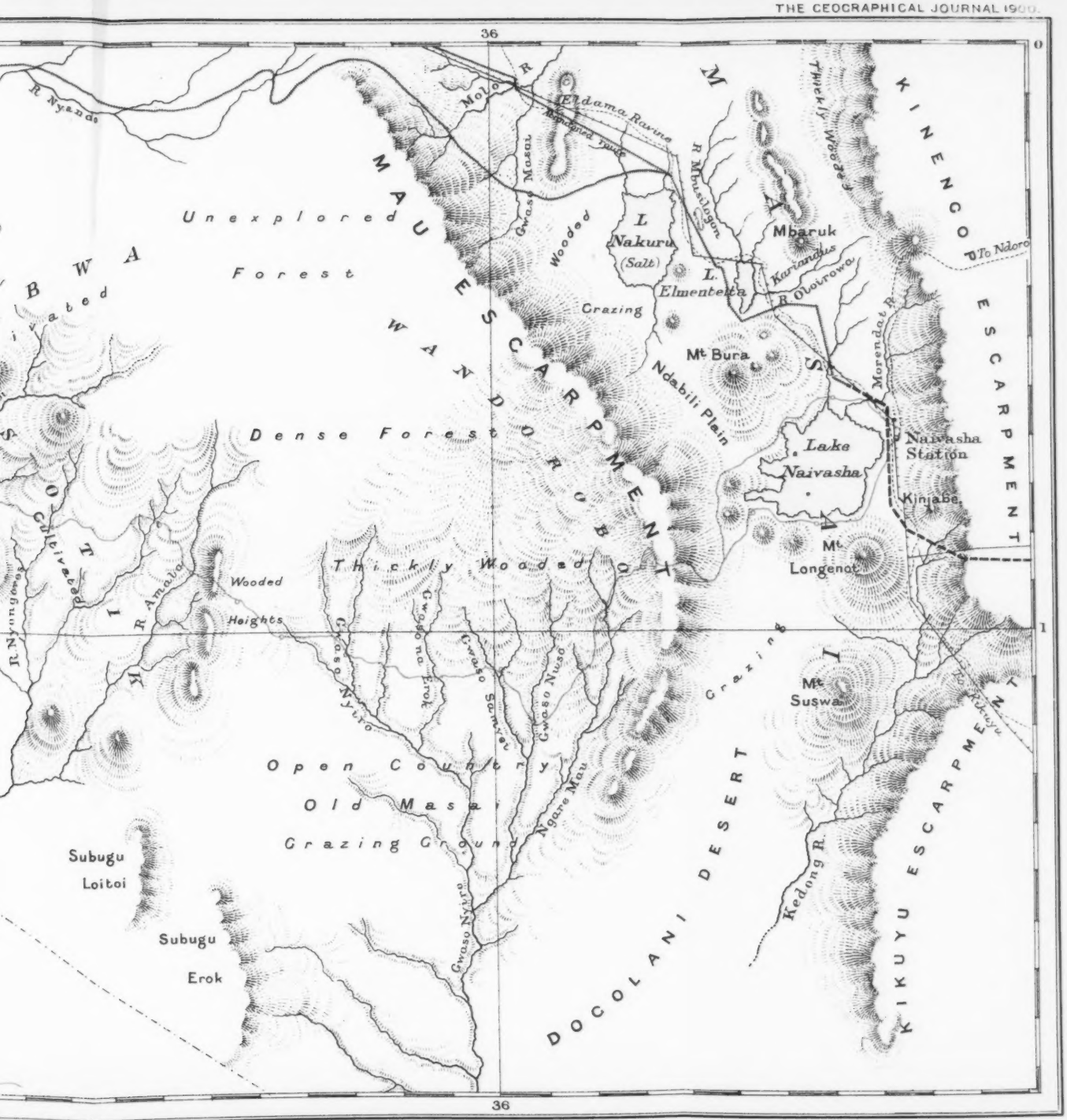
Port Florence
KAVIRONDO
UGOWE
BAY
Swamp
Kibaum
Kargi
Singilli
KACH
Uninhabited
Grassy country
R. Tuyawe
R. Kumsomot
KOSOMBA
KOSOVA
HILLS
Cultivated
KAVIRONDO
BAY
1
R. Nyongore
ANGLO - GERMAN BOUNDARY
SKETCH MAP
illustrating
A JOURNEY FROM L. NAIVASHA
TO VICTORIA NYANZA
BY CAPTAIN C. H. GORGES
of the Uganda Rifles
1899.
Railway constructing
Railway under Survey
Telegraph
Caravan Road
Scale of Miles
0 5 10 20 30
Nat Scale 1:1 000 000 or 15·78 miles = 1 inch
Route
35



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